FLORIDA WILDLIFE®

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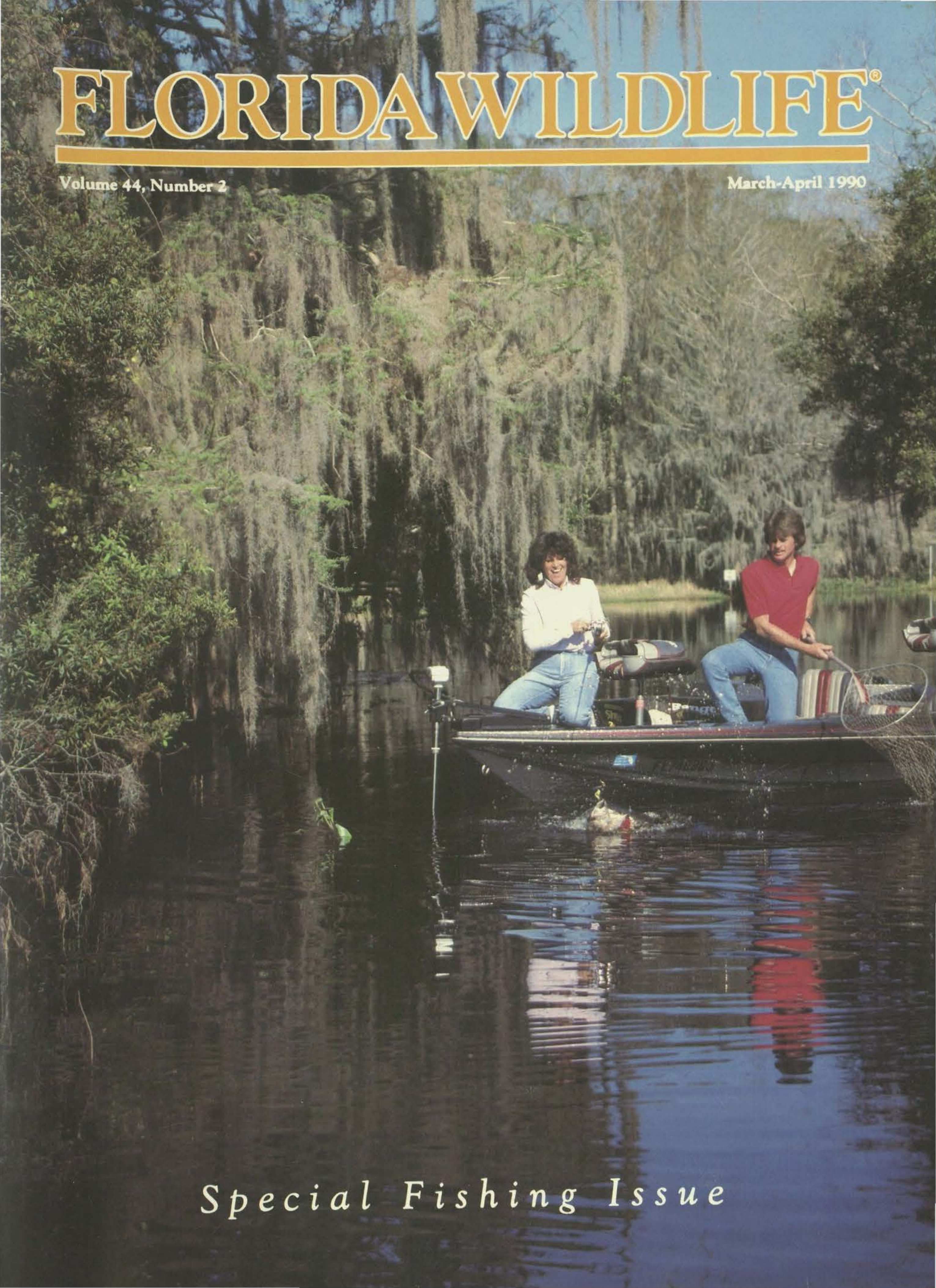
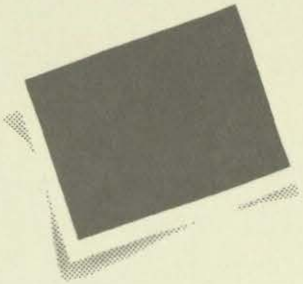
March-April 1990



Special Fishing Issue



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FLORIDA WILDLIFE®

Volume 44, Number 2 March-April 1990

Florida Game and Fresh Water Fish Commission 1990 Publisher

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Our front cover photo was taken by Tom Evans. Burton McNeely caught the action on the back cover.

EARTH DAY
EVERY DAY™

April 22, 1990

We must resolve to make the 1990s the "Decade of the Environment." It must be the decade of DECISION, the decade of ACTION.

— Jay D. Hair, President, National Wildlife Federation

STATE OF FLORIDA
Game and Fresh Water Fish Commission

Dear *Florida Wildlife* Reader:

The Florida Game and Fresh Water Fish Commission is proud of its award-winning magazine — *Florida Wildlife*. This issue for the first time concentrates an entire volume on Florida's tremendous freshwater fisheries resources. Why? Well, let me provide you with a few facts.

Florida has more than 12,000 miles of rivers and streams and three million acres of lakes. Those rich waters provide habitat for 24 species of game fish, which in turn provide more than 39 million recreational days of angling each year. Freshwater anglers spend over one billion dollars annually in Florida on their sport and help support local economies with their spending. Perhaps even more important, a recent Gallup poll demonstrated that 34 percent of adult Americans go fishing each year, which makes it the second most highly preferred recreational activity in our nation. Surveys of licensed anglers here in Florida further point out that 81 percent fish for fun and relaxation, 8 percent for food, 7 percent for the outdoor experience and 4 percent for competition or trophies.

The Florida Game and Fresh Water Fish Commission manages these freshwater fisheries for optimum use, not maximum yield. We recognize the variety of values associated with living aquatic resources. These values include not only sport, food and commercial fishing, but also relate to the beauty and diversity of Florida's rich aquatic ecosystems.

With such a wonderful resource at the disposal of every resident and visitor in Florida, we believe it is fitting to dedicate this March-April 1990 issue of *Florida Wildlife* to fishing. We hope the following articles will help you understand what the Commission is doing to manage our freshwater fisheries for both present and future generations, and to whet your appetite for the peak fishing season that is upon us.

Sincerely,

Robert M. Brantly

Colonel Robert M. Brantly
Executive Director

Mercury in Florida Fish and Wildlife

By Homer Royals
and Ted Lange

STAN KIRKLAND

Mercury pollution has been a serious problem in the U.S. and Canada for more than 15 years. In Florida alone we release 3.9 metric tons of mercury from coal-fired electric power plants annually.

Elevated concentrations of mercury in fish and wildlife from many areas in Florida have led to serious health concerns. Recent analyses of fish from many Florida lakes and rivers have revealed concentrations greater than 0.5 parts per million (ppm) in edible tissue (fillet), prompting the Department of Health and Rehabilitative Services to issue advisories to limit consumption of fish from these waters. In Florida over 1,000 fish have been analyzed for mercury during the past year. In four south Florida areas (Everglades National Park, Savannas State Park, and Water Conservation Areas 2 and 3), average concentrations of mercury in fillets of largemouth bass exceeded 1.5 ppm, above the acceptable limit for human consumption. Limited-consumption advisories have been issued for largemouth bass found to contain between 0.5 and 1.5 ppm mercury in the fillet from the Perdido, Escambia, Blackwater, Yellow, Ochlockonee, Suwannee, Santa Fe, upper St. Johns and Hillsborough rivers, lakes Talquin, Iamonia, Istokpoga, Kissimmee, Tohopekaliga and East Tohopekaliga, Deer Point Lake and in Water Conservation Area 1.

Mercury exists in several forms in the environment, mostly as metallic mercury and mercury compounds. However, it is the organic form, methylmercury, that contaminates fish and other animal tissue. In the aquatic environment, inorganic mercury can be transformed into methylmercury by micro-organisms in the water and sediments. Ultimately, most methylmercury ends up in living organisms due to its ability to diffuse into living cells.

Effects of Mercury Contamination

Mercury has certain properties that cause it to be hazardous to living organisms, including its ability to mutate cells and cause developmental and behavioral abnormalities. Even low levels of mercury in the environment can be harmful, due to the phenomenon known as biomagnification: concentration at successively higher levels at each step up the food chain. Mercury can produce neurological disorders, brain damage, blindness, and can be transferred across placental barriers to unborn children. Methylmercury is up to 100 times as toxic as other forms of mercury.

Fatal mercury poisonings have been reported throughout the world. In 1972 there were 6,530 hospital admissions and 459 deaths reported in Iraq from bread made ▷

when wheat was treated with a mercury-based fungicide. The discharge of methylmercury into Minamata Bay, Japan in the 1950s resulted in lethal concentrations of mercury in fish and shellfish. There were at least 1,800 human victims from consumption of the tainted seafood. Mercury concentrations of over 30 ppm were found in fish from the bay. These concentrations of mercury far exceed those found in Florida's freshwater fish and wildlife. They do, however, represent serious situations that can occur from mercury contamination.

Florida Health Advisory

When average concentrations of mercury are between 0.5 and 1.5 ppm, adults should limit their consumption to no more than one meal of fish per week. Nursing mothers, women who are pregnant or anticipate bearing children, and children under 15 years of age are advised not to eat these fish more than once a month. Fish that contain more than 1.5 ppm of mercury should not be eaten by anyone. These advisories were modeled after those issued by the states of Michigan, New York, and Wisconsin, which also have fish contaminated with mercury.

Mercury Accumulation in Fish

Studies of mercury contamination in Florida have only recently been initiated, but scientists have been studying the problem in lakes of the northeastern United States, Canada and northern Europe for nearly two decades. Mercury can biomagnify in aquatic food chains, moving from the primary producers (algae), filter feeding invertebrates (zooplankton) and insects, to fish, to fish-eating birds, animals and humans in ever-increasing concentrations. Since predatory fish are at the top of the aquatic food chain, they concentrate accumulated mercury from the organisms they consume.

Fish can take up mercury directly from the water through their gills. Although mercury is naturally eliminated from fish tissue, this process is slow and when uptake from food and water exceeds elimination, there is a net increase in mercury concentration in fish tissue. More than 90 percent of mercury in freshwater fish exists as highly toxic methylmercury.

Florida fresh waters come with a wide range of physical and chemical characteristics, which accounts for the fact that fish in some systems have higher mercury concentrations than others. There are many factors that affect biomagnification of methylmercury in fish, including water chemistry, productivity of the water body, and the fish's food preference, age, size, sex and growth rate.

Water chemistry plays an important role in determining the concentration of mercury in fish. Fish in low pH (highly acidic) waters generally have higher concentrations of mercury. Scientists believe that more acidic water dissolves atmospheric and sediment mercury, making the metal more available for uptake by living organisms.

Water chemistry plays an important role in determining concentration of mercury in fish.

Greater biomagnification occurs in oligotrophic (low productivity) waters than in eutrophic (high productivity) waters. Therefore, areas where fish are especially susceptible to mercury accumulation are oligotrophic waters with low pH, low alkalinity (sensitive to acid precipitation) and low organic matter. The more productive eutrophic waters have characteristics that cause mercury to be unavailable to living organisms. Eutrophic waters such as lakes Okeechobee, Apopka, Monroe, Orange and Griffin do not have elevated mercury concentrations in bass.

To date, only harvestable bass over 10 inches and bream over 6 inches have been analyzed to determine if human consumers are threatened. Although trends show an increase in mercury concentrations in older, larger fish, no clear patterns have been established. More data on sub-harvestable and trophy size fish are needed to determine the role that age plays in determining mercury content of fish. Research is also underway to refine our knowledge of relationships between water quality and mercury concentrations in fish from major watersheds of the state.

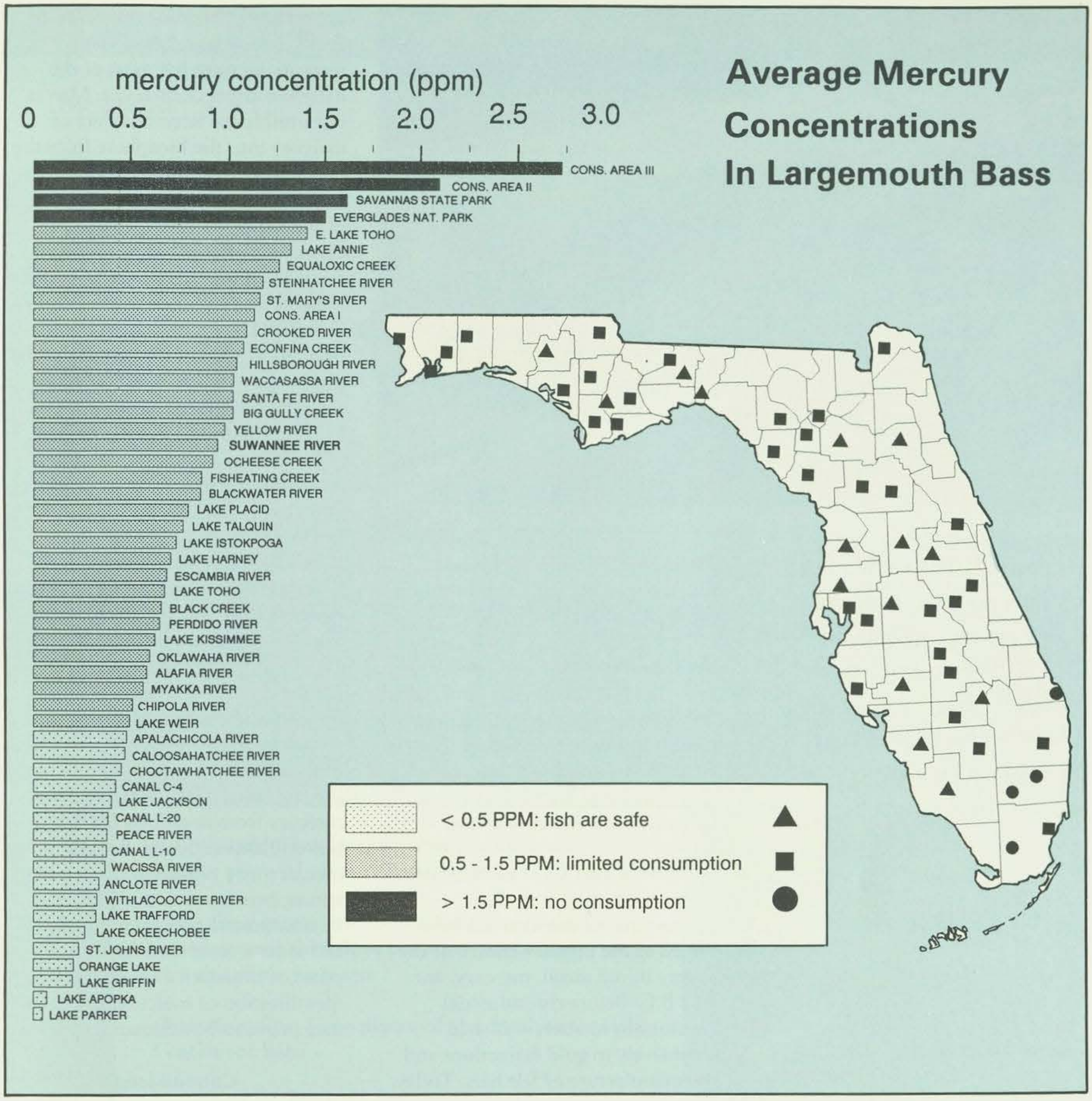
Mercury in Wildlife

Fish at the top of the aquatic food chain are susceptible to accumulation of mercury. Therefore, it stands to reason that fish-eating wildlife may also be susceptible to accumulation of mercury. Birds and mammals readily absorb methylmercury, and as with fish, elimination is slow. Florida wildlife that may be affected includes mammals, reptiles, amphibians and birds.

Studies have revealed accumulation of mercury in many fish-eating birds. Reduced egg laying, impaired feeding behavior, and death have been observed in Florida's loon population. Mercury was found at elevated levels in the tissue and organs of these loons. Surveys have found elevated mercury concentrations in the mottled duck, bald eagle, brown pelican, woodcock, red-tailed hawk, wood stork, osprey and heron.

Alligators have been found to contain elevated levels of mercury in areas where fish have been contaminated. These findings resulted in closing the 1989 fall alligator hunt in the Everglades. The effects of mercury contamination on the alligator population are unknown, but it is suspected that high concentrations could reduce reproductive potential and survival.

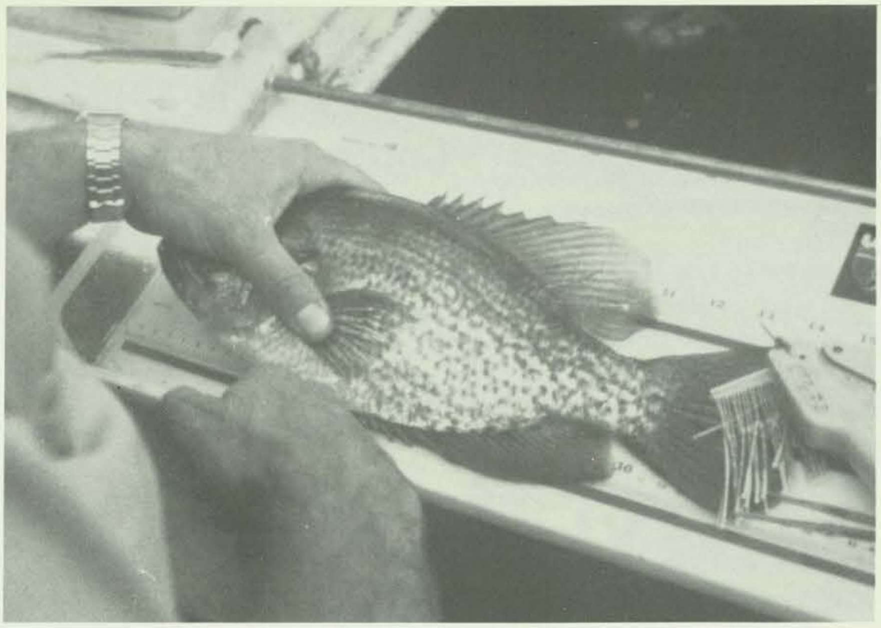
The recent death of a Florida panther prompted research into the effects of mercury on this endangered species. The 4-year-old female was known to have fed upon animals directly tied to the aquatic



Average Mercury Concentrations In Largemouth Bass

MERCURY MARINE

▷



GFC

Research is underway to refine our knowledge of the relationships between water quality and mercury concentrations from Florida's major watersheds.

food chain. A necropsy revealed that the panther had extremely high levels in some of her organs.

Deer from contaminated areas of the Everglades have been sampled and found to contain very low, safe levels of mercury. A wide variety of species has been sampled, including frogs, soft-shelled turtles and crayfish. These animals also contained low mercury levels.

Sources and Uses of Mercury

The mineral cinnabar has been mined as the primary source of the silvery liquid metal, mercury since 415 B.C. Before the industrial revolution, mercury was used extensively in gold extractions and the manufacture of felt hats. Today, manufacturers use mercury to protect against micro-organisms in anti-fouling paints, medical antiseptics, industrial slimicides and agricultural fungicides. The electrical industry uses mercury in switches, batteries, fluorescent lamps and relays. Dental amalgams, pharmaceuticals and the production of plastics, chlorine and sodium hydroxide all rely to some degree on mercury. The U.S. uses 18 percent of the 10,000-15,000 tons used worldwide annually.

Mercury enters the biosphere from both natural and man-made sources. Gases released from the earth's crust, evaporation from oceans, and physical breakdown of rocks, minerals and peat containing mercury account for most of the natural sources of mercury. Man is responsible for large transfers of mercury into the biosphere from the burning of fossil fuels, mining activities, latex paint, and disposal of industrial waste and products containing mercury. As a result of these activities, man has accelerated the process of transferring mercury into the biosphere. It is estimated that 25-30 percent of mercury in the global mercury cycle may be the result of human activity.

For more than 15 years, mercury pollution has been recognized as a serious problem in the United States and Canada. The U.S. Environmental Protection Agency halted all major releases of wastes containing mercury into waters, but mercury from human activities still finds its way into the environment. Worldwide combustion of fossil fuels accounts for release of 3,000 metric tons of mercury into the atmosphere each year, and in Florida alone we are responsible for the release of 3.9 metric tons of mercury from coal-fired electric power plants annually. Because mercury may remain in the atmosphere up to two weeks, it can be transported over long distances and enter a watershed far from the point of emission. Consequently, identification of mercury sources may prove to be a demanding task.

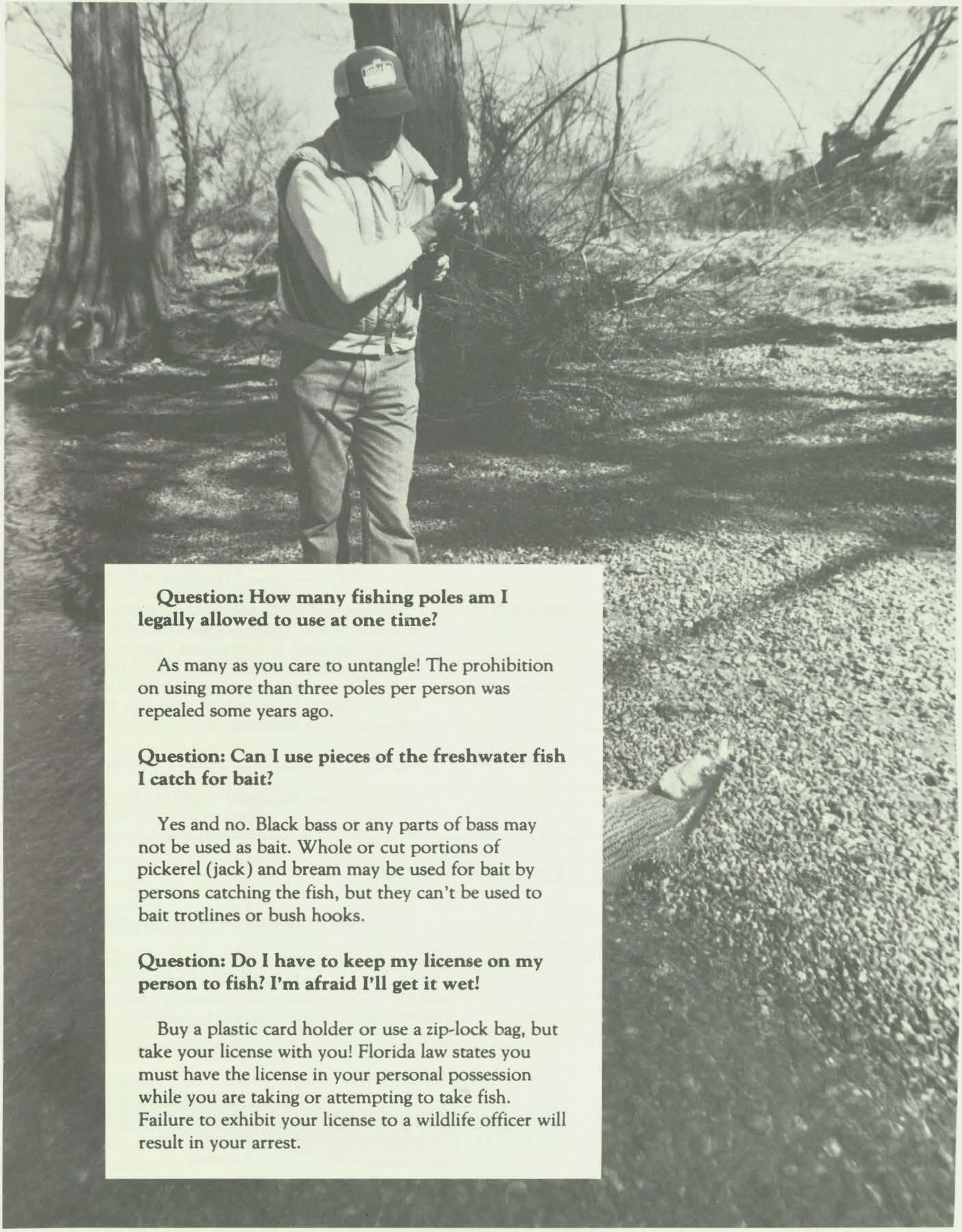
Conclusions

Mercury contamination will have a major effect on managing Florida's fish and wildlife resources. Many factors influence the distribution of mercury in our state waters. The Commission's primary concern is how mercury affects the health of fish and wildlife and the use of those resources. Future Commission actions may include a catch-and-release approach to fishing in affected Florida waters. Mercury sources must be identified to reduce input of this potentially dangerous element to our aquatic environment.

Homer Royals and Ted Lange are chemists at the Fisheries Research Laboratory in Eustis.

It's The Law

By Inspector Kyle Hill



WILLIAM A. GREER

Question: How many fishing poles am I legally allowed to use at one time?

As many as you care to untangle! The prohibition on using more than three poles per person was repealed some years ago.

Question: Can I use pieces of the freshwater fish I catch for bait?

Yes and no. Black bass or any parts of bass may not be used as bait. Whole or cut portions of pickerel (jack) and bream may be used for bait by persons catching the fish, but they can't be used to bait trotlines or bush hooks.

Question: Do I have to keep my license on my person to fish? I'm afraid I'll get it wet!

Buy a plastic card holder or use a zip-lock bag, but take your license with you! Florida law states you must have the license in your personal possession while you are taking or attempting to take fish. Failure to exhibit your license to a wildlife officer will result in your arrest.

1990 *Florida Wildlife* Photo Contest

Contest Rules:

1. **Only original 35 mm slides and 2 ¼ x 2 ¼ inch color transparencies are eligible. Composite slides are not eligible. DO NOT SEND PRINTS, NEGATIVES OR DUPLICATE SLIDES. Print your name on the slide mount for each entry.**
2. **Each entry must be accompanied by a completed entry form indicating the category of competition. Photocopied forms are acceptable if signatures are original. A model release form must accompany entries in category D (the only category where people may be included in the photograph).**
3. **Up to three individual slides may be entered in any of the 1990 contest categories. Entry forms must be labeled to show in which category each photograph is being entered. The 1990 categories are:**
   Category A — Wild birds
   Category B — Wild mammals
   Category C — Wild animals other than birds and mammals, including reptiles, amphibians and insects
   Category D — Florida's natural environment (This is the only category which may show people or man-made objects.)
4. **Entries must be accompanied by a self-addressed stamped envelope for each category. Attach sufficient postage to assure return (do not send money). Entries will be returned after winners are announced in the September-October and November-December issues.**
5. **Each slide entry must be attached to a 3" x 5" card with the photographer's name, mailing address and Social Security number printed or typewritten on the card.**
6. **Only slides taken in Florida are eligible. Captive, domestic and exotic species are not eligible. Employees of the Florida Game and Fresh Water Fish Commission are not eligible.**
7. **Only photographs that have never been published in a magazine are eligible.**
8. **Entrants are responsible for notifying *FLORIDA WILDLIFE* of mailing address changes.**
9. **Entries must be mailed to *FLORIDA WILDLIFE* PHOTO CONTEST, 620 South Meridian Street, Tallahassee, Florida 32399-1600 and must be received by June 29, 1990.**
10. **Any entry not meeting all the rules will be ineligible. Decisions of the judges will be final.**
    Cash honorariums will be awarded.

Official Entry Form

CATEGORY: (Circle One) A, B, C, D

Please Type or Print Plainly

Photograph No. 1 was taken in __________ **County**

and is ______________________________

Photograph No. 2 was taken in __________ **County**

and is ______________________________

Photograph No. 3 was taken in __________ **County**

and is ______________________________

Photographer: ______________________________
City: ______________________________
Mailing Address: ______________________________
State: _____ **ZIP:** ________ **Number of Entries:** ___

I certify that I am the photographer and owner of these entries (photographs) and that all entries were taken in Florida, and I hereby give the Florida Game and Fresh Water Fish Commission my permission to publish my entires in *Florida Wildlife* in accordance with the rules published in the March-April 1990 issue.

Signed: ____________________ **(Entrant)**

Social Security Number: ____________________

Model Release

I, ____________________ (model's name), for good and valuable consideration, do hereby give ____________ (photographer's name) and *Florida Wildlife*, an information and educational periodical magazine published by the Florida Game and Fresh Water Fish Commission, an irrevocable right to use my name (and any fictional name) and photograph for publication in *Florida Wildlife*. I have read this release and fully understand its contents.

I affirm that I am 18 years of age or older.

Witness Signature: ____________________
Address: ____________________
____
Date: ____________________

Signed (Model): ____________________
Address: ____________________
____
Date: ____________________

Guardian's Consent for Minor Models

I am the parent or legal guardian of the above-named minor and hereby approve the Model Release and consent to the use of said minor's name and photograph as aforesaid.

I affirm that I have the legal right to issue such consent.

Witness Signature: ____________________
Address: ____________________
____
Date: ____________________

Signed (Guardian): ____________________
Address: ____________________
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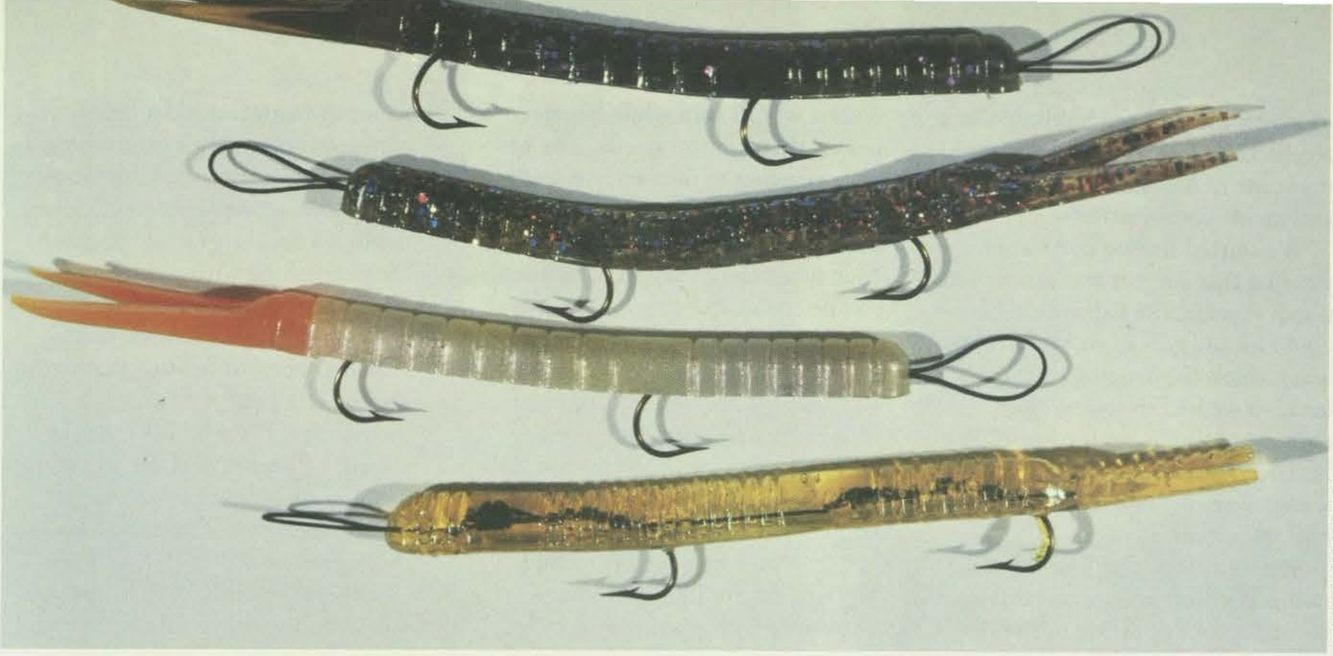
Date: ____________________



PEGGY PERKERSON

Do-Nothing Worms Do Everything!

By Richard Farren

The angler sat watching his line, occasionally lifting and lowering his rod while reeling in a few inches of line. There was a light tug on the rod tip — the angler snapped the rod up, set the hook, and immediately started tangling with a 4-pound bass.

On another day, an angler scanned the water for schooling bass activity. Suddenly, the surface erupted about 75 feet from the boat. Bass literally were chasing threadfin shad out of the water. The angler fired his lure into the frenzy and started retrieving it in a fast, zigzag motion just under the water's surface. A rattle in the lure sent a clicking sound through the surrounding water. Within seconds, an angry largemouth located the sound and nailed the lure.

Still another fisherman, on another day, was casting deep into a patch of submerged vegetation, retrieving his lure at a steady pace while it spun and danced around the weeds. There was a swirl nearby as a bass turned toward the commotion. In a moment, the fish had closed in on the lure and seized it by the head.

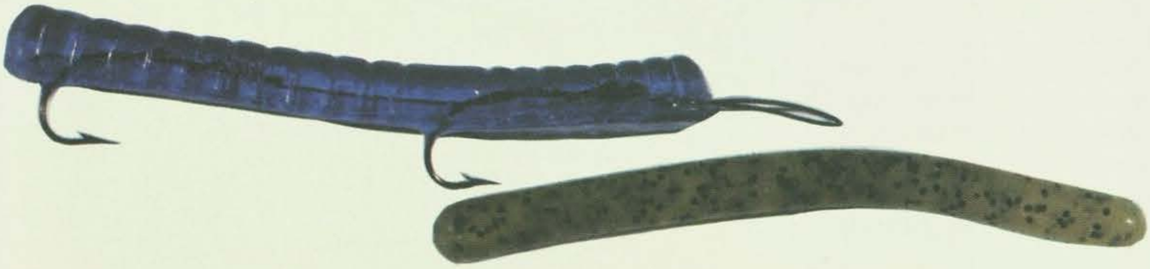
What do these three scenarios have in common, other than the fact that all the fishermen caught fish? In every case they were using the same lure — a "do-nothing" worm. An unlikely name for a lure that actually seems to do everything.

Do-nothings were first popularized in the early 1980s, about the time professional bass angler Jack Chancellor won the Bass Classic. Obviously, it was named for its original purpose, to move slowly when fished along the bottom.

My introduction to a do-nothing was by a bass guide who handed me a lure that looked like a worm that had been caught in the lid of a tackle box. We were fishing in heavy cover and I thought for a moment that he was giving me something he found in the bottom of his boat, figuring I was going to lose it anyway. As it turned out, I had to see him fishing with one before I was ready to believe he was serious.

Bob McGowan, a Tallahassee fishing guide, is one of a growing number of north Florida anglers who have begun taking advantage of the reliability, and seemingly limitless versatility, of the do-nothing lure. In fact, Bob has been instrumental in introducing this style of fishing to the Big Bend area.

Resembling a regular plastic worm with the tail cut off, a do-nothing is usually blunt at both ends and about 3 to 4 inches long. Bob fishes with them year round, rigging them differently for the depth and habitat ▷



in which the bass are holding. On a recent Lake Jackson trip he showed me some of his successful methods and tackle combinations.

We started fishing deep water, figuring that since it was January in north Florida, the fish would be cold and sluggish as we were. There was a thick fog hanging over the lake, so we had to follow the shoreline away from the ramp. We had no desire to run across open water, since at least four other boats had set out ahead of us.

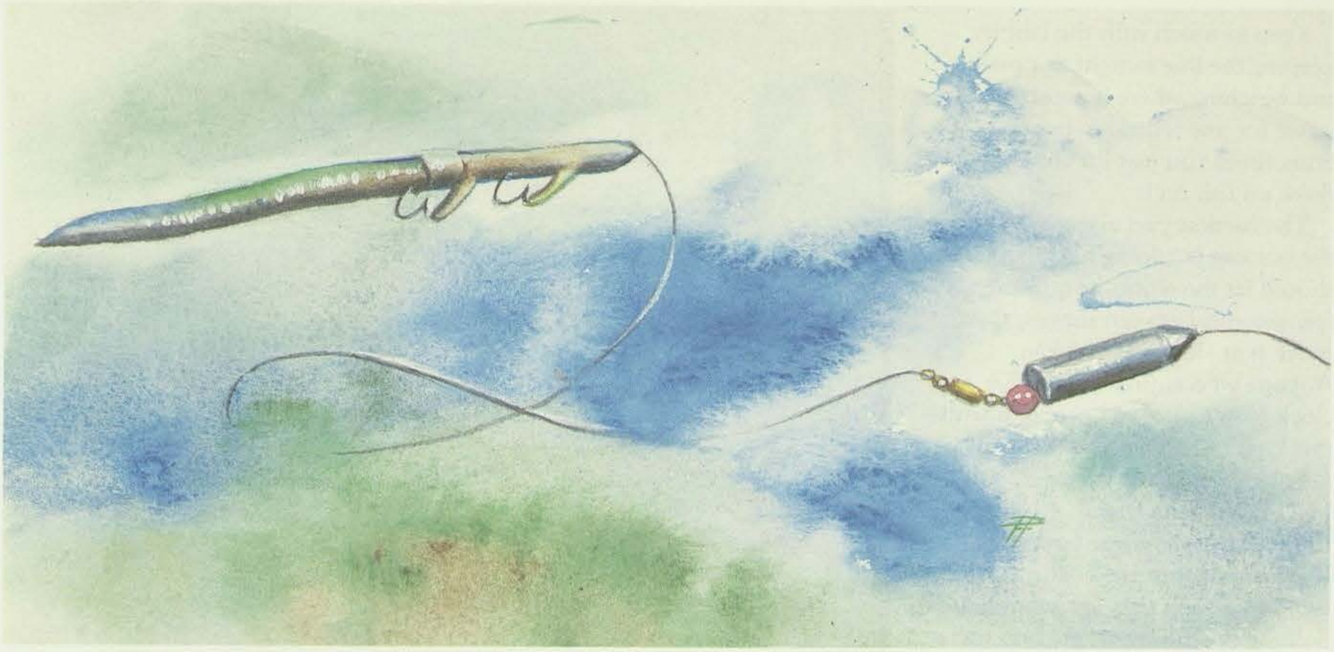
We found the fish scarce for a while, but Bob kept trying different combinations of tackle until hitting upon one that would work best for that day. The answer turned out to be a pumpkinseed-colored, do-nothing worm rigged with a hump in it so it would spin while being pulled through the weeds. The bass were hanging in four to five feet of water and uncharacteristically would come back to the worms three or four times until they were hooked.

The classic question that always comes to mind when someone starts fishing a do-nothing is, "Why does it work?" Why would a bass be interested in a lure about the size and shape of one of those slim little cigars Clint Eastwood used to smoke? Bob's theory is that many of the creatures bass feed on while growing up are long and thin — beginning with plankton and invertebrates and moving up to minnows and shad.

In addition, many conventional lures, like Rapalas for instance, are about the same size. If it helps convince you to try a do-nothing, picture it as a soft, stick lure, only with more action. Like many lures, it will take some practice to get the hang of fishing with it, but the payoff in fish brought to the boat will be well worth the effort.

When bottom-fishing, the worm should be rigged with a 24- to 30-inch leader. Place a bullet weight above the leader, and use a bead to cushion the impact of the weight against the knot. This is also known as a Carolina rig.

The size of bullet weight depends solely on the depth you're fishing. If the water is deep enough, you can easily go as high as one or more ounces, so that the worm reaches the bottom rather quickly. Bob has also



Above: A do-nothing worm with weed guards is rigged with a bullet weight for bottom-fishing.

begun using needle-nosed weights that pull through the weeds better.

Once the lure hits the bottom, point the rod tip in the direction of the worm — tighten the line, then lift the rod and drag the weight a few inches. The much lighter worm, trailing behind the weight, glides up from the bottom then slowly floats back down. Some anglers use a 4- or 5-foot leader, which allows the worm to drift even longer.

You need to wait until you're certain the worm has landed before moving the weight again. A more buoyant type of worm will take longer, especially if it's rigged with lightweight hooks. You can also use a floating worm that rides constantly above the weight. Bob will sometimes peg a small cork a few inches above the worm to help it float.

Always reel in the slack as you let the weight back down. Because the lure is moved so slowly, a feeding bass has no need to be aggressive, which is one key to the worm's success, so it's harder to know when there's been a pickup. ▷

Keep in touch with the bait by keeping the line as tight as possible and watching where it enters the water for any telltale twitches. Sometimes you just lift the rod, and there's a fish on it.

The hardest part about working the bottom is "doing nothing." You should let the worm lie still for a few seconds between moves, then move it as slowly as you can. Anyone who enjoys watching a clock won't have any problem with this type of fishing.

For the less patient angler, McGowan and a friend, Alan Carter, have developed other applications that are a little more exciting. When bass are schooling or holding in shallow water, Bob turns a do-nothing into what he calls a "popping" worm. Rigged without a weight, the lure is retrieved just below the surface in short, jerky movements created by cranking the reel while jigging the rod tip. The lure alternately comes to rest, then darts off in a different direction, making it look alive.

This particular method has been sweeping across those lakes of north Florida where the bass school on threadfin shad every summer. Even on days when schooling bass won't touch more realistic-looking lures, feeding fish can't seem to resist the erratic action of the do-nothing worms.

Another variation is to rig the worm Texas style, but put a hump in it when you turn the hook over, and bury the barb. A "humper worm" spins while being retrieved, so a swivel is mandatory either just above the worm or at the top of a leader.

McGowan works this type of worm with a steady retrieve like you would use when swimming a curly-tailed worm. When pulled through underwater vegetation, it spins beneath the surface and bounces off the weeds. The spinning makes it look like a creature out of control, like something that is injured.

There's a large variety of do-nothing worms on the market, with new shapes and colors being manufactured all the time. Bob prefers a traditional, blunt-ended worm for bottom-fishing and a split-tailed variety when fishing the worm fast. Match the colors for water clarity and local preferences. Basically, select lighter worms for clear water and darker worms for murky water.

Do-nothing worms come in a variety of shapes, sizes and colors.

RICK FARREN

Bob likes to add a rattling bead when fishing in murky water. The beads make noise only when the worm is being worked quickly. By placing the rattle in the tail of the worm, it doesn't interfere with the action, and it allows the tail to ride a little lower in the water than the head.

There are also plenty of variations on hook choices. For the popping worm, Bob prefers using two No. 1 wire hooks: one front and one back. The small hooks don't interfere with the worm's action but they will break off or straighten out if you set them too hard. Fortunately, because the lure is being worked fast, the fish usually hook themselves.

Some tackle manufacturers produce a pre-rigged, double-hook worm with a nylon loop extending out of one end. You can either tie directly to the loop or use a small snap and swivel.

If conditions are weedy, use a worm with plastic weed guards over the hooks. Or simply bend the shank of the hooks until the points barely touch the worm. This will make it almost completely weedless and still allow for an easy hook-up.

For bottom fishing, the worms should be rigged "Texas style" with at least a No. 1/0, turn-around hook. This is vital if there's brush or weeds present because you'll be covering nearly every inch of the bottom on the way back to the boat.

And where will the experiments stop? It's hard to say. But this spring Bob plans to try the "popping worm" method on speckled trout on the grass flats of Apalachee Bay. "Why not?" he explained. "Many bass lures already cross over to the salt water and there are do-nothings now being made in speckled trout colors like red and white, yellow and red, and chartreuse."

Eventually, if McGowan and other anglers keep finding new ways to use these worms, we may not need a tackle box, just a pocket full of "nothing."

Richard Farren is the vice president of the Florida Wildlife Federation (FWF), a nonprofit conservation organization. He frequently writes outdoor articles for local and regional publications and is the editor of "Florida Fish and Wildlife News," FWF's monthly publication.

Restoring Lake Monroe

By Tom Rosegger, Lawson Snyder and Danon Moxley

You've probably overheard someone say, "Twenty years ago I used to be able to catch 10 bass over 7 pounds in one morning of fishing," or "When I was a kid you could snorkel in this lake, and the water was clear as drinking water."

Yes, the quality of many Florida lakes has declined in recent decades. Complaints about the present condition of our lakes and tales of how good fishing "used to be" are echoed by many anglers across the state. Although there are many possible reasons for decline of our sport fisheries, the primary cause is loss of aquatic habitat. Faced with this ongoing problem, the Florida Game and Fresh Water Fish Commission has developed techniques to enhance fisheries and sportfishing by restoring vital aquatic habitat.

One water body to benefit from these techniques is Lake Monroe, bordering the central Florida city of Sanford. At 9,400 acres, Monroe is Florida's 20th-largest lake. In the spring of 1987 the Florida Department of Environmental Regulation, through the Pollution Recovery Trust Fund, provided the Commission with $60,000 for a restoration program on Lake Monroe. Violators of environmental laws pay fines into the trust fund to finance a broad range of lake restoration activities statewide.

In 1989, the Commission's Division of Fisheries designed and implemented a large-scale aquatic ▷

DANON MOXLEY

Fisheries biologist Tom Rosegger inspects eelgrass transplants.

habitat restoration program on Lake Monroe. Once noted for exceptional sportfishing, Lake Monroe has suffered the effects of sewage treatment plant discharges, dredging of bottom sediments and excessive exotic plant populations. The result of these environmental problems has been the loss of desirable native aquatic plants and the habitat they provide, along with a reduction in sportfish populations and recreational activities.

To address Lake Monroe's problems, Commission biologists first surveyed the area to determine the most effective way to spend this money. The survey revealed that, with many shallow areas lacking aquatic plants and healthy fish communities, Monroe compared poorly to other lakes in the St. Johns River system. Biologists determined sportfish productivity in Lake Monroe was severely limited by the lack of suitable aquatic habitat. Therefore, they decided to revegetate the lake with a variety of native aquatic plant species to enhance sport fisheries.

Personnel from the Statewide Lake Restoration Section and the federally funded Lower St. Johns River Sportfish Restoration Project selected manual transplanting, a management technique often used by Commission biologists for re-establishing aquatic plants. A plan was developed to plant 96,000 plants in four different areas of the lake. The five species selected were eelgrass, pondweed, pickerelweed, maidencane and giant bulrush. The four locations were strategically selected to provide relatively shallow water for plant growth in close proximity to deeper waters. The combination of vegetated areas and nearby deep water provides optimal sportfish habitat and outstanding recreational fishing opportunities. Bank fishermen also benefitted from one planting site along a mile and a half of seawall in Sanford.

A private contractor transplanted native aquatic plants last April. By September, 96,000 plants were introduced over 800 acres, or 9 percent of the lake's surface area.

TOM ROSEGGER

A water snake takes advantage of some transplanted maidencane.

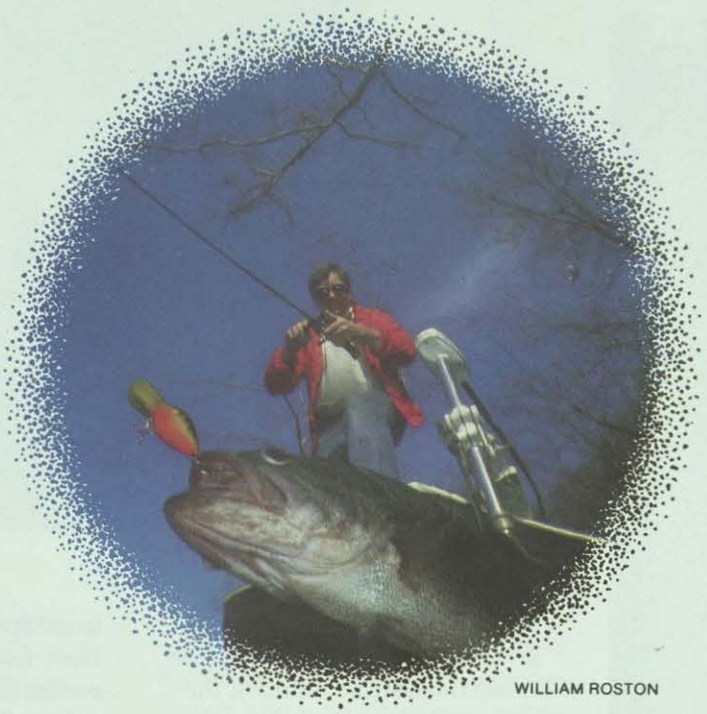
While it will probably take at least two years for plant densities to reach desired levels, biologists have already documented significant new growth and expansion. For example, many giant bulrush plants originally transplanted with two or three stems now have up to 40 stems. Similarly, individual eelgrass plants expanded laterally, budding off up to 30 new plants in just two months.

Although most of the work proceeded smoothly, scientists could not anticipate every potential problem associated with such an effort. Soon after initial transplanting, striped mullet began uprooting and eating some of the newly planted submersed eelgrass plants while feeding on attached algae. Biologists solved this predicament by temporarily fencing off five one-acre areas with chicken wire to protect the plants until they had a chance to become established. After two weeks inside fencing, the eelgrass became sufficiently rooted and initial expansion began.

Although Lake Monroe still faces some environmental problems, the overall revegetation effort has been a positive step forward. This program further demonstrates that the Commission can create healthier systems that will benefit fisheries and wildlife. Fishermen are catching fish in patches of bulrush established along previously bare expanses of shoreline. Further expansion of the transplanted vegetation will continue to improve angler success and increase the recreational and economic values. Biologists accomplished this project at a reasonable cost, further demonstrating the practicality of this particular aquatic habitat restoration technique. The experience and scientific knowledge gained from this large-scale revegetation program will be invaluable in future efforts to enhance sport fishing.

TOM ROSEGGER

A modified buoy informs boaters of the lake project.



WILLIAM ROSTON

Habitat

What is habitat? The word "habitat" comes from the Latin *habitare*, meaning "to dwell." In short, habitat is the type of environment a population of organisms needs to survive. The better the habitat, the larger the population of organisms a lake can support. Habitat requirements are critical for all living things and sportfish are no exception.

What constitutes desirable sportfish habitat in Florida lakes? Studies have documented that shallow-water areas with abundant, diverse aquatic plants and good water quality provide habitat readily used by virtually all of Florida's sportfish. This fundamental relationship between plants and fish provides a foundation for many of the Commission's aquatic habitat restoration and fisheries enhancement programs.

What does this environment provide? Good sportfish habitat furnishes the basic needs of food, spawning areas, and protection for all of our game fish species.

Plant communities support a wide variety of fish food organisms necessary for sportfish populations to flourish. Invertebrates, including insect larvae, scuds, grass shrimp, crayfish and zooplankton, all forage on the vast pastures of algae that grow on aquatic plants. These organisms provide a vital link in the food chain. Attached algae and other microorganisms also attract a host of forage fish, such as killifish, shiners and topminnows that, in turn, provide a food source for larger fish.

Freshwater sportfish spawn in vegetation when it is available. These areas provide protection from wave action that might otherwise destroy beds. Vegetated areas also make protection of spawning beds easier for adult fish, reducing predation on eggs and fry. Aquatic vegetation affords abandoned fingerling fish places to hide from predatory fish while offering a smorgasbord of food items.

What additional benefits do aquatic plants provide? Aquatic plant communities function as natural attractors to adult fish and are valuable to fishermen by providing the angler with important visual cues as to where to catch fish. Aquatic plants also provide an effective buffer against shoreline erosion.

Tom Rosegger and Danon Moxley are fisheries biologists with the Commission's Lake Improvement Program. Lawson Snyder is the research project leader for the lower St. Johns River.

Lake Weir

An Unsolved Mystery

Text and Photographs By Bill Kittrell

The ingredients for a good mystery include a setting rich in natural beauty and history, the occurrence of strange and unexplainable events and, of course, a sleuth to search for clues in hopes of solving the case. All these elements are present in the hills of central Florida.

The setting is 5,685-acre Lake Weir, located southeast of Ocala in Marion County. Serene Lake Weir masks two mysteries that have perplexed fisheries biologists for years. The first began to unfold in 1984 when the entire population of black crappie, or speckled perch, vanished without a trace. Soon after this disappearance, another phenomenon complicated matters even further. Unexplainable fish kills began to plague the remaining sportfish, and many live fish were observed with ghostly white gills. These kills are still continuing after five years, and many questions remain unanswered to the sleuths of this story, Commission biologists and university researchers.

Lake Weir is nestled among rolling hills that once supported vast citrus groves. Dead orange trees now circle the lake as bleak reminders of the severe freezes of 1983 and 1984. A boom in residential development came with the advent of the citrus industry in the late 1800s. Remnants of a former age, many old cracker homes still dot the landscape surrounding the lake. Now, Lake Weir faces modern residential development.

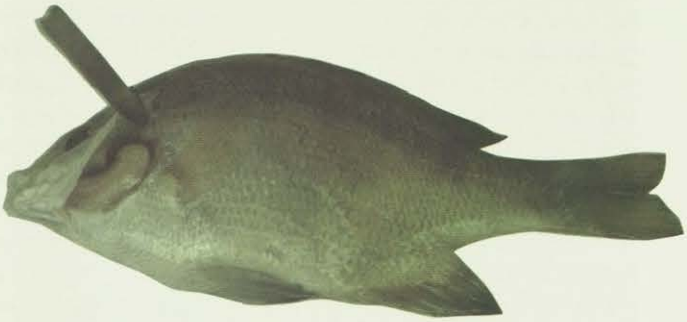
Lake Weir attracts thousands of people yearly to enjoy boating, fishing and swimming. A depth of more than 30 feet in some places, which is unusual for most natural Florida lakes, makes it excellent for sailing and skiing.

Although once known for its sparkling, clear water, Lake Weir began experiencing mild algae blooms in the mid-1970s. This was a telltale sign that the amount of nutrients entering the lake was increasing. Blooms persist nearly year round now, and a muck layer has begun to form in the deeper areas.

All natural lakes begin aging as soon as they are formed. This natural process, called eutrophication, should take thousands, and possibly millions of years. Yet, when mankind interferes with a natural system, it tends to speed up the aging process. Examples of cultural eutrophication, as it is known, include residential development in the watershed, habitat destruction, and discharging of municipal or agricultural effluent.

Nutrient enrichment in Lake Weir is attributed primarily to runoff from residential development. The abandoned citrus groves, which are slowly being replanted, also may have

A fish kill, May 1988.



An anemic bluegill with pronounced white gills.

contributed to the nutrient load. Commission biologists began a five-year study in 1984 to gather information about the fish populations and their habitat as the rate of eutrophication increased.

Although not known for trophy bass, Lake Weir has had an abundance of 1-pound bass. Bluegill and shellcracker also provided a substantial sport fishery. Beautiful Lake Weir's reputation for speckled perch fishing brought many anglers from as far as Kentucky and Tennessee to spend the winter months fishing. It is in this seemingly tranquil setting that our mystery unfolds.

Speck fishing had been good during the winter of 1983-84. Soon afterward, a five-year study was implemented. However, in 1984, the crappie population vanished for no apparent reason. During the first fish population survey, only three small specks were collected. This was very unusual, considering Lake Weir's reputation as a good speck lake. Our curiosity was aroused, and sampling efforts for black crappie were intensified.

Biologists employed electrofishing, gill netting, hoop netting, and trawling techniques, but were unable to collect any crappie throughout 1985. Biologists and fishermen alike know that crappie abundance is cyclical with good years interspersed with poor years. However, it is unusual for the species to drop out of the picture so dramatically. To add to the mystery, anglers who were interviewed during 1985 reported they had not caught specks since early 1984.

Sampling for black crappie continued into 1986 with no success, and anglers were still coming up empty. No crappie were observed floating dead, yet the fish were gone and nobody knew their fate. This phenomenon, to our knowledge, has never been documented before in Florida. To have an entire species of sportfish disappear so suddenly and unexpectedly was bad enough, but things were soon to get even worse.

During this same time frame, other unusual events began to occur that compounded the Lake Weir mystery. A limited fish kill of large shellcrackers occurred during the summer of 1985. Since they were primarily large fish, and we could identify no specific cause, we assumed that an old age class was dying. This appeared to be the logical answer. However, another kill occurred during the summer of 1986 that affected several fish species. The majority of fish killed were yearling bass and bluegill, although a few large bass up to 23 inches were found. Approximately 30 dead fish were observed daily throughout the summer.

Upon closer examination, struggling and recently dead fish were found to have pinkish or even white gills. Live fish with white gills baffled everyone. We had never confronted a problem of this nature before. The ghostly appearance of the fish prompted one investigator to muse, "It looked as though a vampire had drained all their blood." In the meantime, unexplainable summertime fish kills continued.

At this point, Commission fisheries biologists called in numerous state agencies and experts from Auburn University and University of Florida to aid in determining the cause of the kills.

They performed a variety of tests on samples of water, bottom sediments and fish flesh before uncovering any significant clues. Blood work on the fish had confirmed that they were anemic, but the reason was unknown. Heavy metals and pesticides were eliminated as factors causing the anemia. Investigators from Auburn University determined that Lake Weir bass contained heavy infestations of white grubs (a common fish parasite) in the vital red-blood-cell-producing organs. Further analyses by researchers at the University of Florida School of Veterinary Medicine corroborated these findings. They theorized that an extremely heavy parasite load might be causing anemia that ▷

contributed to summer kills. However, this is not a proven theory, and the ongoing kills remain a mystery, at least for now.

You are probably still wondering about the crappie. We continued sampling during the fish kill investigations with no luck. After a two-year absence from samples and anglers' stringers, we assumed that crappie numbers were too low to effectively reproduce or provide acceptable fishing. Although the disappearance of the species could not be explained, stocking began in the spring of 1986 to re-establish crappie. During the fall of 1986, a juvenile speck was collected by electrofishing, the first since 1984. Stocking continued into 1987 with over 400,000 fingerlings and 600 adults introduced. However, results have been limited with only 21 fish collected since the stocking program began.

At first glance it appears as though this five-year study generated more questions than answers. Why did black crappie disappear? Why has the population been slow to recover since stocking? Why are Lake Weir bass more heavily parasitized by white grubs than bass from other lakes in the area? Is this high infestation rate causing anemia and death in fish? Many questions remain unanswered, but valuable information was gained from the work that will add to an understanding of Lake Weir's fisheries resources.

The study showed that fish habitat is slowly degrading as the eutrophication process accelerates. The number of keeper-size bass collected by electrofishing declined 46 percent in the past five years. This population decrease is due, in part, to the ongoing fish kills. According to the local Economic Development Council, Marion County is the nation's second-fastest-growing area. Undoubtedly, growing pains in the form of development will place even greater burdens on the fish habitat in Lake Weir.

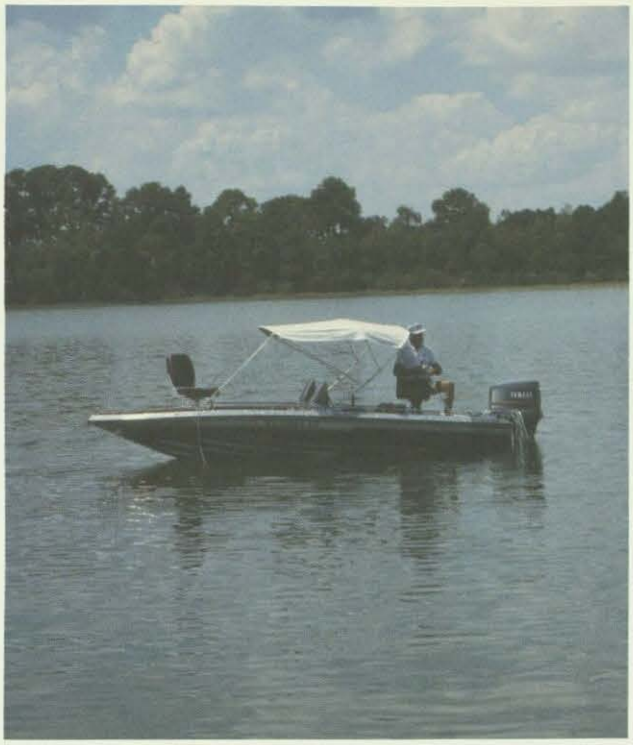
Although Lake Weir's forecast calls for stormy weather, these dark clouds do have silver linings. People are becoming more aware of the important resources that Lake Weir provides and the necessity of preserving those resources. Lake Weir was recently designated an Aquatic Preserve by the Department of Natural Resources, which should afford the lake some protection in the future. In the meantime, biological studies are continuing on the lake. Although the intensive five-year study was completed, periodic surveys will be continued in order to monitor the fish population. In addition, the Commission recently contracted with the University of Florida to further investigate the causes of the anemia.

Whether Lake Weir will give up its secrets is unknown. However, one thing is certain. As long as the mysteries remain unsolved, the sleuths will stay on the case.

Bill Kittrell is now employed as the district biologist for the Virginia Department of Game and Inland Fisheries. He was a biologist in the Commission's Central Region when he wrote this article.

Residential development encroaches Lake Weir's shoreline.

In 1934 the notorious Ma Barker gang rented this house on the north shore of Lake Weir where they planned to fish and hunt. A four-hour raging gun battle with FBI agents brought national attention to the area.



Thousands of people visit Lake Weir annually to enjoy fishing and other recreational activities.

A newly planted orange grove overlooks Lake Weir.

DAN DOBBINS

LAKE TALQUIN DRAWDOWN

By Dan Dobbins

VINCE WILLIAMS

Above: An aerial view of Lake Talquin.

Below: Lake Talquin's drawdown.

Success was at hand. The largemouth bass population in Lake Talquin had increased by a tremendous 700 percent, and numbers of young black crappie had also increased significantly. After the recent drawdown, these preliminary sampling results were an indication of good things to come for the many local and out-of-state anglers who frequent this popular water body.

Lake Talquin is a 10,200-acre reservoir on the Ochlockonee River, just west of Tallahassee. In the fall of 1984 Commission fisheries biologists were in the early stages of evaluating the effects of Talquin's extreme drawdown, or dewatering, on sportfish populations in the reservoir. Earlier Commission dewaterings of lakes Tohopekaliga and Kissimmee in central Florida had produced dramatic improvements in fish populations and aquatic habitat. The drawdown of Lake Talquin, however, marked the first attempt at using this valuable fisheries management tool on a large, north Florida reservoir.

Lake Talquin's water level had remained generally stable for more than 25 years. A layer of mucky, organic ooze covered much of the reservoir bottom, killing important aquatic vegetation necessary for a thriving sport fishery. Biologists working on the reservoir considered the once-outstanding fishery to be only marginal in quality.

The drawdown commenced in September 1983, when the gates of Jackson Bluff Dam that created Lake Talquin partially opened, and the water level dropped by 19 vertical feet. This exposed 75 percent of the reservoir bottom until a two-stage refill would raise the water level by

13 feet in February and another 6 feet in June. The drying effects of sunlight and air consolidated the soft, unproductive muck into a firm, compact crust. When reflooded, this new and improved sediment would become productive bottom habitat capable of supporting large numbers of food organisms vital to an expanding fish population.

Two months after the drawdown, rye grass was aerially seeded on "plots" of exposed reservoir bottom. By February, when the first stage of the refill began, the rye grass had grown several feet high. One thousand acres of flooded rye grass plots produced temporary nursery areas, providing food and shelter for young fish until more permanent littoral habitat developed in the spring.

As the days lengthened and the ground warmed under the spring sun, seeds began to germinate in the still-exposed areas of the reservoir. Many of these seeds had lain dormant on the reservoir bottom for years. Stimulated by the drawdown and spring weather, they would eventually grow and form the foundation for a thriving, dynamic sport fishery.

Plant growth was rapid in the firm, nutrient-laden sediment. By the time final refilling of the reservoir began in June, 1,500 acres of lush, aquatic habitat had replaced the useless, organic muck. Flooding this habitat produced vital, long-term nursery areas needed for survival and growth of young fish through their first year of life.

By the following autumn, one year after the drawdown began, the population of young largemouth bass and black crappie had exploded — testimony to the importance of the new habitat. As these fish grew into adults, both species produced record harvests.

Fish and anglers weren't the only ones who benefitted from dewatering. The new aquatic habitat provided an increased food supply for ducks and other waterfowl. Herons, egrets and other wading birds took advantage of abundant small forage fish present along the shoreline. The number of nesting pairs of osprey occupying the reservoir more than doubled — a dramatic example of how wildlife benefits from this management technique.

Using drawdowns to enhance fish populations and rejuvenate lake ecosystems is not new in Florida. Fisheries biologists conducted the first such drawdown in 1971 on Lake Tohopekaliga, or "Toho," a 22,700-acre lake in Osceola County. That dramatic success demonstrated the importance of dewatering as a fisheries management tool and led to similar programs on other Florida lakes.

The practice of artificially manipulating lake and reservoir water levels to improve fisheries evolved from biologists recognizing the importance of fluctuations in natural lakes. Most lakes in Florida have undergone cycles of dewatering and refilling for thousands of years. These cycles, generally caused by variations in seasonal and annual rainfall patterns, were often dramatic. Several years of drought could reduce a good-sized lake to isolated potholes. On the other hand, a hurricane could flood thousands of acres of exposed lake bottom overnight. In some cases, these natural cycles of water-level fluctuation lasted several decades.

Over time, the lake's ecosystem of plants and animals adapted to these cycles of drying and refilling. In many instances, species came to ▷

When reflooded, the new compact lake bottom became productive, capable of supporting large numbers of food organisms vital to an expanding fish population.

DAN DOBBINS

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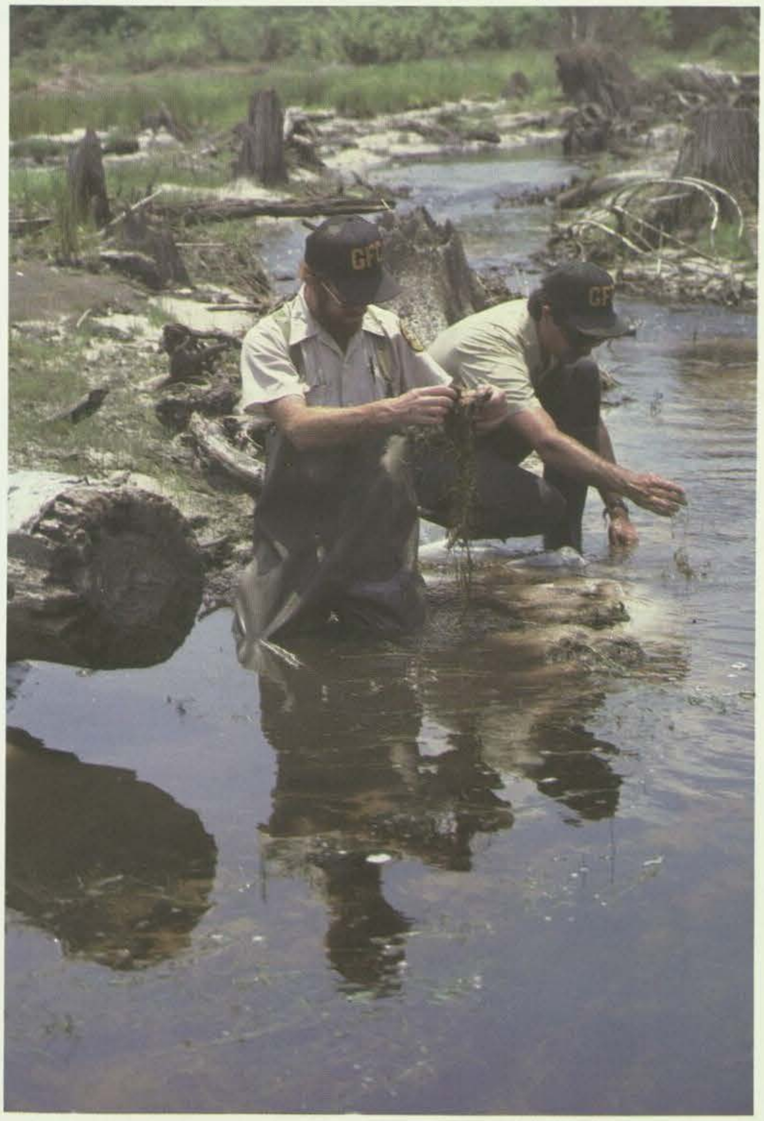
The drying effects of sunlight and air consolidated the soft, unproductive muck into a firm, compact crust.

Biologists replanting Lake Talquin with aquatic vegetation.



WILLIAM A. GREER

depend upon water level fluctuation to maintain a healthy, dynamic population.

Unfortunately, the water levels of many Florida lakes no longer fluctuate in their historic, natural patterns. A burgeoning human population, their fear of flooding, and an almost insatiable desire for waterfront development have resulted in the stabilization of water levels in many major Florida lakes. From a biological standpoint, the results have been predictable and, in some cases, catastrophic. A severe decline in the quality and quantity of aquatic habitat is common in such lakes. It's also typical for layers of unconsolidated organic muck, or ooze, to build up on lake bottoms. In extreme cases, these deposits may be over 10 feet thick. Huge numbers of undesirable roughfish, such as gizzard shad, thrive under degraded conditions, often dominating fish populations. In many lakes, inflow of treated sewage effluent and large volumes of urban and agricultural runoff aggravate the problem. In these circumstances, a drawdown is often the only feasible way of returning a lake to a more natural state.

We seldom have the luxury of taking years to complete a drawdown to improve fishing and restore important aquatic habitat. Man-made drawdowns must be planned so necessary habitat improvement occurs within a few months. Factors such as refilling capabilities, local rainfall patterns and peak fishing seasons are thoroughly examined. Additionally, habitat-restoration potential and status of existing sportfish populations are determined. Only after making these assessments will scientists draw down a lake.

When properly conducted, drawdowns produce major improvements in sportfish populations. Within two years after the lake's initial drawdown in 1971, sportfish abundance doubled to 244 pounds per acre in Lake Toho.

Following a second dewatering in 1979, sportfish abundance increased to a whopping 395 pounds per acre.

Lake Kissimmee, also located in Osceola County, was the second lake to undergo a Commission drawdown. Sportfish abundance in this 44,000-acre lake peaked at 257 pounds per acre following dewatering, doubling its prior average. A 1984 drawdown of Lake Griffin, in the Oklawaha chain of lakes, resulted in similar improvements in sportfish populations.

In addition to benefitting fish and wildlife, lake drawdowns often have a positive economic impact. Fishing is big business in Florida. Sportsmen spend more than a billion dollars a year on freshwater sportfishing-related expenses. The sport fishery of a heavily utilized lake may provide over a million dollars annually to local businesses in bait and tackle sales, lodging, meals, gasoline purchases and other related items. In lake-rich Osceola County, angling is a $16-million-a-year business. Improved fishing produced by a drawdown often results in more visits by anglers and increased spending at local businesses.

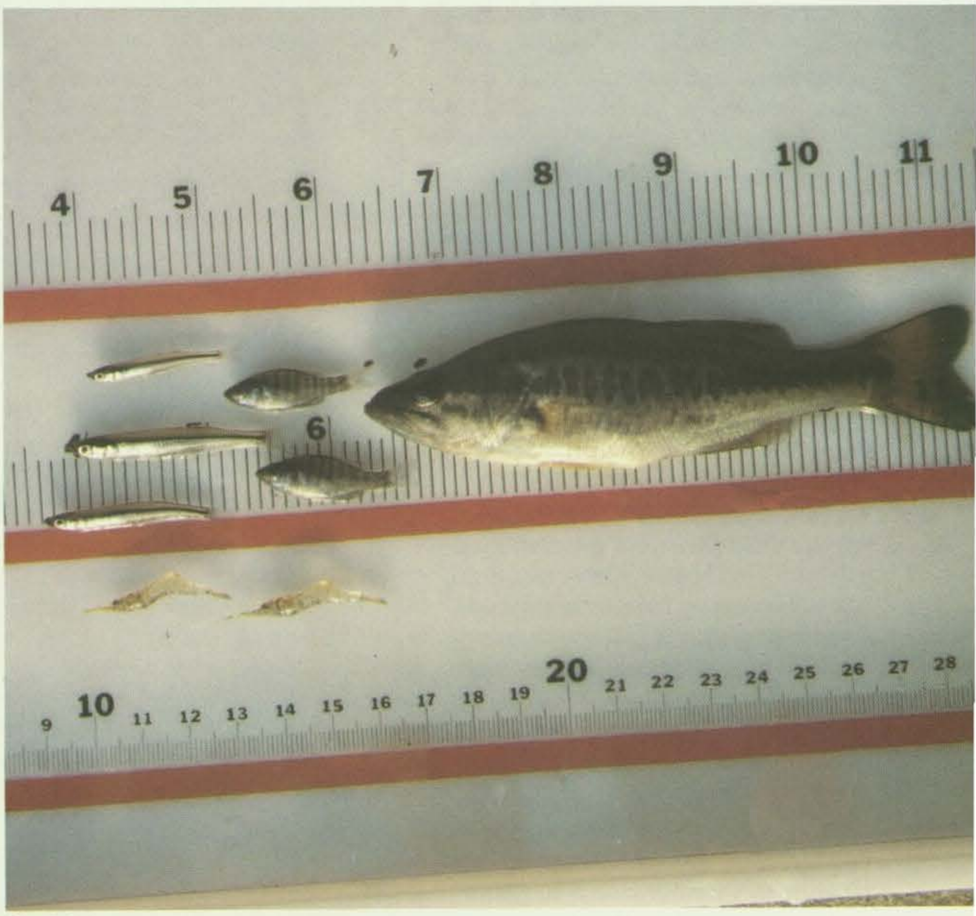
While drawdowns dramatically improve sportfishing, the results are only temporary. The return to a stabilized water level restarts the same sequence of events that led to a decline in the original quality of the sport fishery. Sooner or later, additional dewaterings are necessary to rejuvenate a lake's ecosystem and boost its sport fishery. The time between dewaterings varies from lake to lake and is influenced by many factors. Typically, improvements last for three to five years before starting to decline; therefore drawdowns need to be conducted every five to eight years.

Dewaterings are not a cure-all for the problems affecting Florida lakes today. No matter how successful, they merely treat symptoms and not problems. By mimicking natural cycles of water level fluctuations, fisheries biologists re-create conditions necessary to produce healthy, abundant sportfish populations. This extremely valuable management tool is capable of reversing man's negative impacts — at least temporarily.

The diversity of benefits provided by lake drawdowns demonstrates their importance as a fisheries management tool and also illustrates the interdependency that exists between us and our environment. More people move to Florida every day. Ultimately, this means more pressure on a resource already suffering from the effects of human activities. As this human pressure increases, the need for lake drawdowns is also likely to increase accordingly.

Dan Dobbins is a fisheries research biologist with the Ochlockonee River Watershed Project.

When properly conducted, drawdowns produce major improvements in many kinds of sportfish and fish food organisms.



DAN DOBBINS

BURTON McNEELY

Largemouth Bass Reproduction

Restocking Our Lakes Naturally

By Steve Crawford, Wesley Porak and Rich Cailteux

Get a group of bass fishermen together and, sooner or later, the talk will turn to the fish's spawning habits. "Closed refuges will improve fishing," some say. "This bass would have weighed 2 or 3 pounds more if it had not already spawned," or "Bed fishing is ruining the bass fishery" are other popular opinions. Still other anglers feel that stocking bass is the ticket to improved fishing.

Who's right and who's misinformed? The best way to separate fact from fiction is to gain a better understanding about the beginning of life for Florida's most popular gamefish.

Sexual Maturity And Egg Development

Sexual maturity (when a fish is capable of reproducing) in largemouth bass is dependent on both their size and age. Faster-growing fish tend to spawn at an earlier age than slower-growing fish. Florida largemouth bass spawn as early as 9 months of age. However, male bass usually mature at about 10 inches (2 to 3 years old) and female bass typically mature at 12 inches or greater (2 years old).

Fecundity refers to the number of eggs a female fish produces. Fecundity varies with age, size and general fitness of a fish. Food supply and water quality can also influence fecundity. A ripe female largemouth can produce from 2,000 to 145,000 eggs. The larger the bass, the more eggs the ovaries contain. Research indicates that fecundity peaks when a female bass is 5 or 6 years old and declines after age 7. The eggs from older bass may be just as viable as those of younger fish, but poor physical condition in a very old bass may affect its spawning performance. Although egg size increases with the size of a female, larger eggs do not necessarily produce larger fry. Studies also indicate that larger female bass tend

Spawning Seasons And Refuges

Fishermen and conservation groups frequently request closed seasons or refuges to increase production of largemouth bass. Research has shown that these measures simply do not work. Several studies indicated the number of adult largemouth bass has no bearing on the number of young bass produced each year. Spawning refuges on the St. Johns River did not have a positive effect on bass reproductive success. To maintain a constant number of bass in a lake, only two bass need to survive to adulthood in order to replace every pair of bass that spawns. Since only a small fraction of the population is caught during the spawning season, removal of these largemouth bass does not reduce the number of bass produced from one year to the next. With high fecundity rates, largemouth bass produce more fingerlings each year than the habitat can support.

Closed fishing seasons during the spawn will not enhance spawning of largemouth bass at current levels of fishing pressure. Moreover, data from Tenoroc State Reserve suggest that catch rates are higher for several weeks following the opening of a lake that has been closed and then receives high fishing pressure. Biologists speculate that bass become conditioned to angling practices with a continuous fishing season and are less vulnerable than bass in a lake that has not been fished for a few months.

TED BENEDICT

to mature and spawn earlier in the year than smaller females.

Largemouth bass eggs begin to develop long before the spawning season. Eggs go through four different stages of development within the bass' ovary before becoming fully mature. Anglers mistakenly comment that bass caught during the fall appear to be in spawning condition, but in reality eggs are in the early stages of development at this time. A ripe female can rarely be found in spawning condition during the fall. During the spawning season, an individual bass ovary may contain all stages of eggs. As a result, all eggs are not spawned at the same time, and females likely spawn more than once each season. Most female largemouth bass examined after the spawning season did not release all of their eggs. Those eggs not released during the spawn are reabsorbed.

Many anglers believe female bass that have spawned could have weighed 2 to 4 pounds more if the fish were still full of roe. However, ovaries of a ripe female bass weigh only 2 to 8 percent of the total body weight of the fish, while ovaries average less than 2 percent of the fish's body weight after the spawning. Thus, even a 12-pound bass would lose less than a pound of eggs during the spawning season.

Spawning And Nesting Behavior Of Bass

Largemouth bass spawn earlier in the year than other freshwater sportfish in Florida, except black crappie (speckled perch). Day length probably influences reproductive development and "brackets" the time period when spawning occurs. The urge to spawn is stimulated during late winter or early spring when water temperatures rise to 58°-65°. Spawning continues as water temperatures rise above 70°. Biologists have observed spawning activity from December to June in Florida. However, a major spawning period usually occurs during February and March, depending on water temperature. Weather ▷

conditions, such as cold fronts and strong winds, can disrupt and delay spawning. The largemouth bass spawning season usually lasts much longer in Florida than it does in more northern climates.

Although bass frequently nest along shorelines, they often prefer protected areas such as coves and canals. These areas offer the greatest protection from wind, which is a major factor contributing to nest failure because of its scouring action on eggs and fry. Since water temperature rises earlier in canals, more largemouths may be attracted there to spawn. One study reported that biologists sampled five times as many bass in canals during the spawning season compared to the previous fall. A large portion of a bass population will sometimes spawn on the northern shore of a lake to escape prevailing north winds. Protection from the wind is also provided by aquatic plant cover, docks, fallen trees or other structures.

Nests are usually constructed on firm lake bottom, such as sand and in areas with vegetation or debris. Spawning success is greater when plant fragments or other debris are in the nest. Nests have also been found among roots of lily pads, maidencane (a shoreline grass) and cattails, particularly in areas lacking a firm lake bottom. Silty or muddy bottom types are not conducive to spawning. Nests are usually located in 2 to 4 feet of water, but have been found at depths from 8 inches to more than 10 feet. Water clarity limits the depth at which largemouth bass nests are found.

A male largemouth bass fans out a circular bed by placing its lower jaw near the bottom of the nest and rotating around this central location, using his fins to clear debris. Nest diameter is about one and one-half-to-two times the length of the fish, and depth is usually less than 6 inches. Male bass caught during the spawning season commonly have frayed fins and abrasions on their lower jaws as a result of nest building and maintenance. Largemouth bass are territorial and seldom build nests less than 8 to 10 feet apart. Spawning beds of blue tilapia, known locally as Nile perch, are often mistaken for bass beds but are normally built in more open areas, are much closer together, and are two to three times deeper than largemouth bass beds.

TED BENEDICT

The dramatic spawning ritual usually occurs between dusk and dawn. One to two days after nest construction is complete, the male bass searches for a ripe female, attracting her with vivid, rapid color pattern changes. The pair returns to the nest and the male stimulates the female with a series of bumps to the side and nips to the head. Both fish roll slightly, with vents close together, and eggs and sperm are emitted, resulting in fertilization. This behavior is repeated between periods of rest, and spawning may last up to two hours.

When courtship is completed, males immediately begin to guard the nest. The females may also stay near the nest or swim a short distance and remain listless for up to a day. Male and female largemouth bass may spawn again with another partner. Infrequently, spawning-induced stress (usually complicated by secondary bacterial infections) will result in death of the adults.

Early Life History And Development Of Bass Eggs And Fry

A single nest may contain up to 43,000 largemouth bass eggs. Interestingly, studies conducted in Lake Weir during 1968-69 indicated that active largemouth bass nests frequently contained eggs of other fishes.

The male bass must regularly fan the nest to circulate fresh water over the largemouth bass eggs to avoid fungal or bacterial disease. Fanning also provides aeration and prevents silt from covering the eggs.

Although the incubation rate increases with water temperature for largemouth bass, eggs usually hatch within two to four days following the spawn.

Newly hatched bass, called larvae or fry, are less than one-fifth of an inch in length. They have a built-in food supply, called a yolk-sac, that provides nourishment for 13 to 15 days. Yolk-sac larvae are unable to swim until about four days after hatching. By the time they are eight days old, the mouth is fully developed and larvae begin to feed on microscopic animal organisms (zooplankton) that are suspended in the water. It is critical that suitably sized zooplankton, small enough to be eaten by bass fry, be readily available when the larval yolk-sac is depleted. Numbers of young bass can be reduced by an overabundance of shad or other species of fish that feed on the same kinds and sizes of zooplankton.

An abandoned nest is prone to excessive predation. An active nest must be constantly defended against predators such as bluegills, crayfish, dragonfly nymphs, diving water beetles, and some species of snails. Survival of bass eggs or larvae is greatly reduced when these predators are overabundant. Male bass seldom feed when guarding a nest, but because of their aggressive behavior they will attack anything considered threatening. This behavior makes bedding males highly vulnerable to anglers during the spawn.

Adverse weather conditions and poor water quality can also greatly affect survival of bass fry during the first two weeks of life. A sudden decrease in water temperature can shock the developing embryos or larvae, causing them to become deformed or to die. Inclement conditions will sometimes force male bass to abandon their nests. Muddy water or a drastic decrease in oxygen levels or pH can also result in increased fry mortality. These adverse conditions may occur during high winds or periods of heavy rainfall, particularly with excessive agricultural or stormwater runoff.

Male largemouth bass continue providing parental care as the fry grow. Schools of 3,000 to 4,000 bass fry may occur from March through May. The guardian duties of the male largemouth bass end when the young bass are about an inch in length and begin to disperse from these schools.

Recruitment Of Young Bass Into The Adult Population

Recruitment is the addition of new fish to the harvestable population by growth from smaller size categories. Understanding the processes of recruitment is essential to understanding largemouth bass population dynamics. The number of bass that can recruit into a fishery is usually determined during their first year of life when survival is estimated at less than 1 percent. Despite the large number of fingerlings produced, only 2 to 3 per spawning pair need survive to adulthood to maintain bass populations.

Studies in Lake Dora in Lake ▷

Stocking Fingerling Largemouth Bass

Stocking largemouth bass fingerlings will not increase the number of adult bass unless there is a problem with natural reproduction. Nature has compensated for low survival in the early life stages with the prolific nature of largemouth bass. Having high fecundity rates, largemouth bass produce many more offspring each year than the available habitat can support, which in turn limits the number of bass that can survive. This "overproduction" of young is the primary reason why stocking additional bass fingerlings will not improve a largemouth bass fishery. The amount of quality fishery habitat is the limiting factor.

PHIL CHAPMAN

County have shown that May and July tend to be critical months for survival of largemouth bass during their first summer. This critical stage appears to be related to the availability of suitably sized prey at a time when the young bass start to become piscivorous (feeding on fish).

Because young bass are also vulnerable to predation throughout their first year of life, cover is extremely important at this time. Survival of small bass usually increases with the abundance of aquatic vegetation, which provides cover and food organisms such as aquatic insects and small fish. Aquatic vegetation essentially serves as nursery areas for young-of-the-year largemouth bass. Increasing water levels during spring and summer improves the survival of fingerling bass by flooding vegetation, which increases protective cover and food supply. Survival may decrease if water levels recede during this period.

As we gain understanding of largemouth bass population dynamics, our ability to improve the fishery increases. Anglers and biologists working together to improve habitat will enhance future fishing opportunities.

Steve Crawford, Wesley Porak, and Rich Cailteux are fisheries biologists with the Largemouth Bass Research Project.

Aquatic Plant Management

Growth of aquatic plants in Florida's waters often reaches levels that interfere with recreation, which creates pressure from various user groups to remove vegetation, often with little regard for the fishery. For aquatic plant management to be effective, whether through biological or chemical controls, it must provide nursery areas for young bass as well as forage.

Management of aquatic plants is a very complex problem in Florida. For example, fishermen are almost always discontent when small stands of water-hyacinths are treated with herbicides, but from a management standpoint, the most efficient and environmentally safe treatment is before excessive growth of hyacinths occurs. Hydrilla is another plant that provides excellent bass habitat, but it can out-compete many beneficial native plants and grow to levels that interfere with bass fishing. Triploid grass carp and aquatic herbicides have been used successfully to control hydrilla. However, triploid grass carp must be properly managed to prevent their removal of native vegetation when hydrilla is gone. Where conditions are suitable for growth of beneficial native plants, hydrilla should be kept in check. In lakes that cannot support native aquatic plants due to excessive nutrients, hydrilla can be managed to benefit the fishery.

PHIL CHAPMAN

Delicate Balance

Species: Suwannee Bass (*Micropterus notius*)
Florida Status: Species of Special Concern

One of four kinds of freshwater black bass inhabiting Florida waters, the Suwannee bass was scientifically described as a distinct species in 1949. The Suwannee bass is found only in the Suwannee River system of Florida and the Ochlockonee River in Florida and Georgia. Although these rivers are only about 75 miles apart in Florida, the species is not known to inhabit the smaller rivers lying between them. It appears to be most abundant in the lower portion of the Santa Fe River, the major Florida tributary of the Suwannee River.

Suwannee bass are restricted to flowing waters, with a preference for areas containing rocky shoals. They also exhibit a fondness for spring-fed streams such as the Ichetucknee River. They have not been reported from Lake Talquin, an impoundment of the Ochlockonee River, although they occur both above and below this reservoir.

Spawning usually takes place from March through June, peaking during April and May. Males construct and guard circular, bowl-shaped nests in typical sunfish fashion. Females produce 2,500 to 12,000 eggs, with an average of about 5,400 per female.

Crayfish form the bulk of the diet, although other fish, crustaceans and aquatic insects are also eaten. Some scientists believe that maintenance of an adequate supply of crayfish may be essential to the preservation of this species.

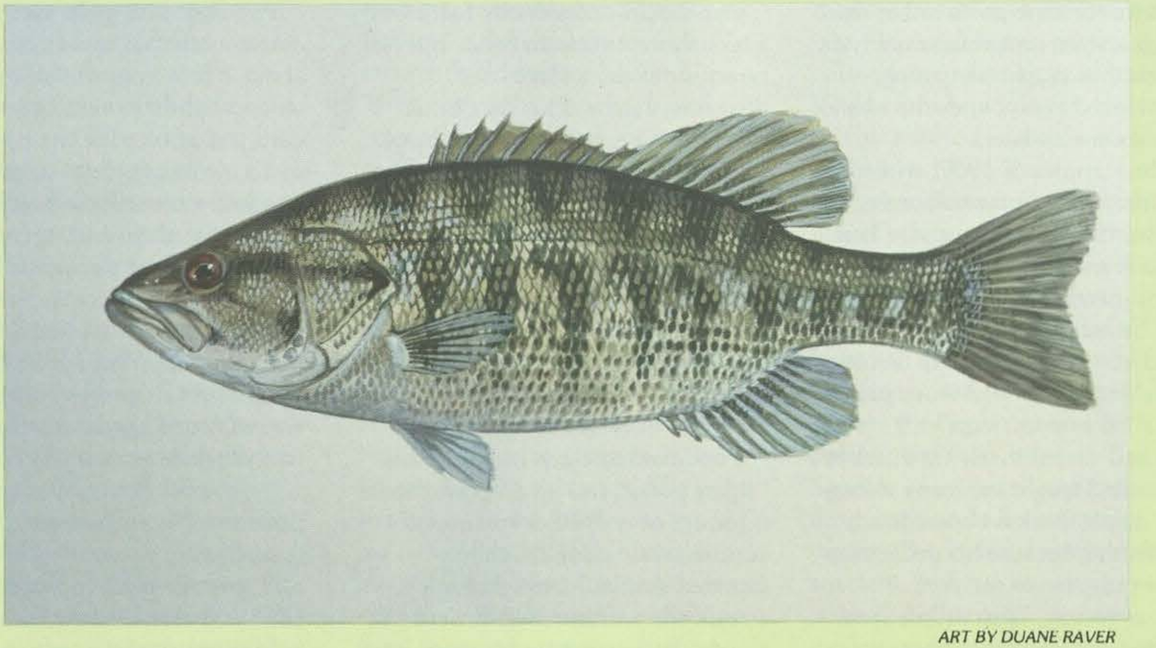
Relatively small by comparison with largemouth bass, most Suwannee bass do not exceed 2 pounds in weight. The state record is a 3-pound, 14¼-ounce fish caught from the Suwannee River in 1985.

The Suwannee is one of three bass often called "small-mouthed" bass in Florida. This species may be readily separated from the largemouth bass by noting the length of the upper jaw. In the Suwannee bass, the upper jaw does not extend behind the eye. Shoal bass and spotted bass are also "small-mouthed" bass inhabiting Florida; however, neither of these lives in streams containing Suwannee bass. Most Suwannee bass are marked with dark, somewhat diamond-shaped blotches along the sides, and are usually bluish on the underside of the head and breast.

The Suwannee bass is classified as a species of special concern because of its restricted range, almost entirely confined to Florida. Presently, populations appear to be stable, and there is no reason to restrict the harvest of this scrappy sportfish. Principal threats to its existence are water pollution and stream-side development, which destroy shoreline habitat. Conservation efforts currently consist of monitoring population trends and water quality protection.

— Gray Bass

Gray Bass is the director of the Commission's Blackwater Research and Development Center in Holt.



ART BY DUANE RAVER

Cane Pole Fishing

By Lt. Vinard Hitt, Central Region

I was 6 years old in 1953 when he first took me fishing. To some, his name was Louis; to others, L.T.; to me, Pop. His name was Louis Tucker Hitt, and he was my grandfather.

Pop loved to fish. He had fished throughout his lifetime, and since retiring from a nearby Georgia cotton mill, he fished nearly every day. Pop was a cane pole fisherman. Sometimes he used a short, stubby pole, but usually he favored a long, limber, varnished, seasoned pole rather than any of the myriad forms of manufactured tackle that were being marketed at that time. At 6 years of age, I didn't think Pop was much of a fisherman because of his preference for cane poles rather than the bright, shiny, manufactured rods and reels that caught my young, inexperienced eyes. I knew he would change sooner or later.

By the summer of 1957, when I was 10, my faith in manufactured tackle was firmly entrenched. I had caught several largemouth bass with a second-hand reel that was bound tightly by baling wire to the handle of a rickety casting rod. My favorite artificial bait was a well-worn plug called a "Whopper Stopper."

Pop had shared many experiences with me and taught me many things. Still, I didn't think he knew much about fishing because his dedication to cane poles never wavered. For whatever reason, I just didn't seem to realize that Pop caught bass as well as bream with his cane poles, and I was convinced that I knew more about fishing than Pop did. That shouldn't surprise anybody though. Most everyone probably knows that 10-year-old boys are embodied with infinite wisdom and know more about lots of things than adults.

Pop's dedication to cane poles never wavered, and he caught fish, lots of fish.

Pop would occasionally fish from a lake shore or stream bank. But he rarely sat under a shade tree drowning earthworms on a hook suspended beneath a piece of bottle stopper cork that was dangling from a pole propped on a rock or forked stick. He usually fished from a boat, using cane poles with live bait as well as homemade and commercial artificial baits. He used them in several interesting and innovative ways, and he caught fish, lots of fish.

Pop loved to catch bass with his "jigger pole," and he dragged untold numbers of redbellies (redbreast sunfish) and stumpknockers (spotted sunfish) from beneath streamside willows as he drifted slowly downstream in his small boat and "throw fished" a small, floating, artificial fly. Pop also sculled his way upstream and "drop fished" a live, wiggly worm in shaded eddies and sheltered areas around logs, stumps and rock piles.

When Pop wanted to catch bass he would usually use a long, fairly stout cane pole and shiners for bait, but occasionally he would reach for his jigger pole. Pop's jigger pole was a stout, 12-foot piece of bamboo that was nearly 2 inches thick at the base and almost one-half-inch thick at the tip. Pop had cut the pole from a streamside cane thicket and dried and cured it himself. The thing was reminiscent of a 12-foot broom handle, but it served Pop's purpose perfectly.

Pop rigged his pole with a stout cotton cord that was attached at about 2 feet from the base and wound tightly toward the tip. The cord was knotted at the tip, and 12 to 18 inches was left dangling. He attached a homemade bait he called a "bob" to the dangling end of the string. This lure was made by tying some barnyard chicken feathers to a large treble hook and adding a piece of leather cut from an old boot tongue and shaped to resemble some sort of four-legged critter (a lizard or frog maybe).

Jigger-pole fishing was always done at night and required someone (usually me) to paddle a boat slowly as Pop worked his lure against the bank and shoreline vegetation. Pop held the butt of the pole in one hand and placed the other hand

Angler Gordon Spratt pulls in a redbreast from the Oklawaha River that he caught with a cane pole and live bait.

VINARD HITT

about three feet further along the length of the pole toward the tip. Using the hand on the butt of the pole to make the tip vibrate and the other hand to steady the pole, Pop would constantly thrash the water with his bob as well as the tip of the pole. Strikes were violent, water-slinging affairs that occurred more frequently than one might suspect. The fish were usually large and were unceremoniously hauled in hand-over-hand.

The technique that Pop called throw-fishing was a great deal easier on the wrists and forearms. When doing this, Pop chose a very limber 12- to 14-foot slender pole. He would attach a piece of 20-pound monofilament line equal to the length of the pole and tie on a small white or yellow floating artificial popping bug. Pop would drift downstream and throw the bug beneath the overhanging trees. Many, many bluegills, redbellies and stumpknockers, along with an occasional small bass, fell victim to this method.

In the March-April 1986 issue of *FLORIDA WILDLIFE*, well-known outdoor writer Horace Carter described a technique for catching shellcrackers (redear sunfish) from north Florida's Orange Lake. Because the local folk used nothing but a pole, line, hook and grass shrimp for bait and not even a split shot for weight or a float or cork of any kind, Carter claimed these folk were fishing with a "nothing pole."

One of Pop's favorite techniques also involved nothing but a pole, line, hook and bait, but was somewhat different than the activity described by Carter. Pop's term for the method was "drop fishing," and he practiced it along a river bank rather than a lake shore.

Carter observed bream fishermen using short (6- to 8-foot) poles and short pieces (4 to 5 feet) of small-diameter monofilament line. These fishermen were fishing in a lake among thickly matted water lilies. They placed their hooks, baited with grass shrimp, in small spaces of open water next to the pads and allowed the bait to sink slowly. The bait was often taken as it drifted slowly toward the lake bottom.

For drop fishing, Pop preferred an extremely limber, whip-like pole 10 to 12 feet long and no more than three-quarters of an inch in diameter at the base. He would sit near the bow of his narrow, square-ended john boat with a short paddle in his left hand, his can of worms between his feet and his pole in his right hand. He would scull slowly into the current, never taking his paddle from the water except to bait his hook or remove a fish, and delicately drop his worm-baited hook in small eddies and shaded areas of slow-moving water next to rocks, stumps, logs and other shoreline structures. Pop preferred a long-shank No. 10 Carlisle hook, a fresh, lively worm and 6 to 8 feet of black-braided line when fishing this way. Pop, who hooked his worm once through the middle, preferred the black line instead of monofilament. As a fish took the bait, Pop could often see the dark-colored line move through the water long before he could feel the strike.

This method worked well for redbellies, bluegill and stumpknockers and also produced lots of warmouth and speckled perch (black crappie), as well as various species of catfish.

Pop passed away in June of 1957. I was 10; he had just turned 72. Obviously, I didn't have much respect for Pop's prowess with cane poles at the time. But I do now, because I've "discovered" that, with the exception of long-distance casting, Pop could do darn near anything with his versatile cane poles then that I can do now with modern manufactured tackle.

STRIPERS

In the Chipola River-Again!

Text and Photographs By Michael J. Hill

I was surrounded by nearly clear water tinged an iridescent blue-green, towering bald cypress and tupelo trees. Endemic but rare Barbour's map turtles crowded logs in the beautiful Chipola River. A flash of gold — a Prothonotary warbler flitted by, and a red-tailed hawk soared overhead. The obnoxious static from my radio receiver broke the serenity to remind me of my primary reason for being on the river. As enjoyable as the sights were above the water, my quest was for a species that lives below the surface. I was searching for several striped bass fitted with radio transmitters. Using a special antenna, I can pinpoint these fish within a 1/4-mile radius.

One particular day, the raucous noise was becoming almost unbearable when suddenly, the static gave way to a rhythmic, meaningful cadence of musical beeps from the striper with transmitter #569. As I timed the identifying beeps, I was able to calculate the temperature of the water the striper had found. Striper #569 must have found a cool-water spring (70°F), which this species desperately needs in the hot Florida summer months.

In this case it seemed peculiar, since no nearby springs were known. Generally, a spewing spring run or boil could be seen from the bank in areas of the river where the other radio fish had been found. We surmised that #569 was residing in an area of the Chipola River with some hidden underwater springs. After we repeatedly located #569 at this exact spot and verified its cool-water preference, we planned a dive to investigate further.

As we donned our SCUBA gear several days later, we were excited at the prospect of discovering a new spring and were hopeful that there would be other stripers accompanying #569. The tracking boat located "old reliable" and directed us to the area. We had frightened #569 away but luckily found the spring anyway. Although we were hoping to see several monstrous striped bass swimming in the spring, we were not disappointed to see a single

Above: A "bugged" striper swims freely.
Inset: Inserting the transmitter.

2-pounder swimming about. When our air ran low, we retreated to the boat, and the tracking crew followed #569 back to its favorite cool spot.

Striped bass tracking is part of a study by the Commission to learn more about what might be a distinct population of stripers known as the "Gulf Coast" striped bass. These Gulf Coast stripers may have been a small population of striped bass that separated from the Atlantic Coast fish during prehistoric times when Florida emerged from the sea. The Gulf Coast striper appears to have adapted to the major rivers which flow into the Gulf of Mexico. A noteworthy striper fishery existed in the early part of this century, but after more dams were constructed across striped bass spawning rivers and thermal refuges like the Chipola River, fewer and fewer stripers were caught.

Unlike other striped bass, Florida stripers reside in rivers most of the year, restricted to fresh water because of their low tolerance of the warm temperatures in the Gulf of Mexico. Striped bass move up rivers during their spawning runs to congregate with other stripers and reproduce. Fertilized eggs must then float or tumble downstream until they hatch. Recent dam construction hinders stripers from migrating upstream, and reproduction in recent years has been marginal.

The Apalachicola River was dammed in 1957 and formed Lake Seminole, isolating former spawning habitat in the Chattahoochee and Flint rivers. Probably no one suspected there was a decline in the striped bass population. Many striper fishermen reported catching 40-pound stripers below the Jim Woodruff Lock and Dam on the Apalachicola River. Many old-timers also tell of seeing schools of large stripers packed into the springs of the Chipola River, the largest tributary of the Apalachicola.

The striper population in the Apalachicola-Chattahoochee-Flint river system (A-C-F) was dealt a final blow in 1960 with the construction of a sheetpile dam across the Chipola River, near Wewahitchka. The main purpose of the dam was to stabilize the water level in Dead Lake, a wide, cypress-filled section of the Chipola River regionally famous for its shellcracker fishery. Many fish camps around Dead Lake boast old photos of limits of bream and large, impressive striped bass caught below the new Dead Lake dam.

As the years passed, fewer stripers were observed in the springs of the upper Chipola River and even fewer were caught below the dam. It was well documented that the Chipola River provided a major thermal refuge for striped bass, although it is only speculated that many spawned there. This cool-water refuge was effectively blocked by the construction of the Dead Lake dam. Poor water quality and declining fish populations developed after the water level was stabilized in Dead Lake, and in 1987 the dam was removed (see sidebar, page 35).

Removal of the Dead Lake dam and restoration of the natural flow of the Chipola River created a perfect opportunity to find out if any Gulf Coast stripers would return to the Chipola River and how many fish would take advantage of the cool water. Commission biologists decided to "tag" a few ▷

Biologists aerially tracking striped bass over the confluence of the Chipola River and the Chipola cutoff.

stripers with radio transmitters and release them at selected sites on the upper Chipola River. This would enable us to see if these fish would locate the thermal refuges and tip us off to the presence of resident stripers which could now swim through Dead Lake to the upper Chipola River.

Ten hatchery-reared Gulf Coast striped bass were surgically implanted with an internal radio transmitter about the size of your index finger. With two batteries for power, the whole rig is about 4 inches long with a 10-inch steel antenna and weighs slightly more than a half-ounce in water. Each transmitter has a separate radio frequency enabling us to identify individual fish. The transmitter was placed inside the body cavity alongside the fish's stomach. Except for a 1-inch vertical scar on the striper's left side and a steel wire trailing behind the tail, one would not notice that this was a "bugged" fish.

In May 1989 six stripers were released near I-10 at Marianna and four fish were put in near Blountstown, at S.R. 20. They surprised us almost immediately with their tendency to travel. The fish dispersed so widely that only one or two fish could be pinpointed by boat on any day. So we elected to fly the entire 96 miles of the Chipola River on Monday and then track by boat for the rest of the week. We averaged finding six radio fish on any flight, but we never found all 10. One fish has never been found, possibly due to a defective transmitter. Another striper had been gigged* and was found dead at Marianna Caverns State Park.

The tagged stripers swam 80 miles up the Chipola River.

Initially, all fish moved upstream and predictably settled into a spring or cold-water creek. At least four stripers were regularly located in the vicinity of two different creeks. We rarely pinpointed the stripers between the creeks but frequently found fish in one creek one day and in the other creek the next. Perhaps the stripers moved from refuge to refuge at night when we were not there.

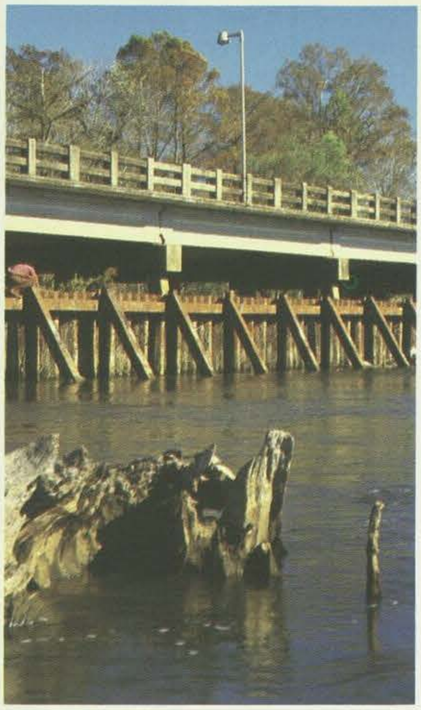
A "premium" cold-water refuge often would attract and retain a transmitter fish. When we consistently located a transmitter fish (#138) in the same spot in an upstream refuge, we assumed the fish was dead and the transmitter was lying on the river bottom. We decided to SCUBA dive to retrieve the transmitter from the "dead" striper so we could reuse it. Swimming around the spring mouth searching in vain for the "dead" fish, we anchored ourselves on the bottom, hoping for something to happen. Much to our surprise the "dead" striper, complete with trailing antenna, swam right by us along with six untagged, smaller striped bass! Our confidence bolstered by this experience, we investigated other thermal refuges and almost always found untagged stripers swimming about. They must have made their way from the Apalachicola River through Dead Lake and up the Chipola River, a distance of no less than 80 miles.

When cooler weather came, tagged stripers became more difficult to locate. Since the thermal refuges were no longer essential for their survival, some fish had already moved downstream. After a lean summer in the Chipola springs, stripers travel to the forage-rich waters of Apalachicola Bay. At the time of this writing, at least three stripers have passed through Dead Lake toward the coast. One of the fish was the "dead" striper, which had made a trip of 110 miles from the upper Chipola to the pinhook of the Apalachicola River. That's a pretty healthy trip for a dead fish!

The Commission has no intention of stocking striped bass directly into the Chipola River. Forage fish abundance in this river is not adequate to support many predator fish like striped bass. On the other hand, the lower Apalachicola River has a better forage base but not enough thermal refuges. After monitoring striped bass stocking rates in the Apalachicola River and Lake Seminole, we know the most important factor for survival of stripers, particularly during the summer, is cool thermal refuges.

Now that Dead Lake dam is gone, we believe that a very favorable combination exists between the cool water of the Chipola River and the forage base of the Apalachicola River system. This combination may significantly enhance the survival and return of trophy striped bass to the Chipola River.

**Editors note: It is illegal to gig any freshwater sport fish.*



A Dam Removed

The construction of a dam on Dead Lake initiated a familiar cycle of problems observed wherever impoundments have been created. In the typical scenario, productivity increases dramatically as flooded terrestrial vegetation provides quality habitat. Fish populations experience explosive growth in response to the greatly increased food supply. However, when a lake is deprived of the flushing effects of river current and periodic exposure in dry weather, water quality soon deteriorates, bottom habitat becomes unsuitable for spawning, and fishing success plummets.

It was no different on Dead Lake. Soon after the dam was installed, fishing was reported to have been phenomenal. The original dam incorporated a capacity to dewater the lake and refurbish degraded habitat. Unfortunately, this dam blew out in 1961 and was replaced by a spillway arrangement which allowed little fluctuation. Vegetation problems (notably waterhyacinths) quickly plagued Dead Lake, and the accumulation of huge amounts of decaying plants on the lake bottom affected fish spawning. Eggs laid in this loose, mucky substrate became fungus-laden and had low hatching success. The large amount of decaying plant matter depleted oxygen levels, further reducing fish abundance.

By 1984, growing dissatisfaction with the quality of fishing in Dead Lake led to demands for the dam's removal. The public had become aware that stabilized water levels are not nature's way of maintaining quality fish habitat and populations. Following several years of debate, administrative hearings and vandalism, the steel sheetpile structure was completely removed by December 23, 1987. This was followed by removal of some of the rocks blocking the river channel in February 1989, and the Chipola River was free to follow its natural course.

Although fish populations have not returned to earlier abundant levels, improved water quality is evident. Prior to removal of the dam, oxygen levels in much of the lake were below three parts per million (ppm). Recent samples indicate oxygen is above the minimum level of five ppm needed to maintain sportfish and is distributed evenly at all depths.

Dead Lake will not return to its former state overnight. The deleterious impacts of water stabilization have been taking their toll for over 25 years. In time, a return to natural water fluctuation should improve habitat to maintain a unique, diverse sport fishery.

Michael Hill is a fisheries biologist with the Apalachicola River Basin Project.

WILLIAM A. GREER

The 'Compleat' Survey

By Scott Hardin

"Where are they biting?"

It's probably the question most often posed by fishermen, but the answer depends entirely on who is asked. For example, your best fishing buddy might reply, "Hey, I found a great place. Go ahead and put on this blindfold, and I'll take you there."

Or a bait and tackle store owner may say, "Where? They're biting everywhere, friend. Step over to this shelf here and let me show you what they're hitting."

Or the fish camp operator might inform you that, "You have found the right place, man. They're tearing it up right here. Now, how many nights will you be staying?"

Special creel survey techniques help biologists determine which lakes are healthy.

On the other hand, if you asked a fisheries biologist, you might hear something like this: "Our most recent peak season creel survey indicates good bass fishing with a harvest rate of 0.26 and a total caught success rate of 0.37 bass per hour."

"Pardon me?"

Before you shuffle off, muttering about how you had wasted your fishing license fees, consider the biologist's perspective is just as valid as all the others. While you might have been snooping for a place to double over your rod this weekend, the fisheries biologist is concerned with the long-range picture. His interest is in cataloging how well Florida's important lakes and rivers produce fish for anglers, day in and day out, over the course of the fishing seasons.

Biologists use a technique known as the creel survey to accomplish this. The creel survey is a systematic method of sampling how anglers are faring — sort of a Nielsen rating for lakes and rivers. Checking the numbers and kinds of fish caught on randomly chosen days enables fisheries scientists to estimate fishing pressure (hours fished per acre), harvest (number of fish kept), catch (number of fish, either kept or released), and success (number caught or kept per hour).

The most commonly used creel survey in Florida is the roving patrol, where a survey clerk counts all the anglers on a lake (or part of a lake). Then he interviews as many anglers as possible, asking which species they are fishing for, how many fish they have caught, and how long they have fished that day. It is vital that the data be accurate, so the clerk may ask to count the fish.

Another type of survey intercepts anglers as they complete their trips, typically at a boat ramp. This "access point" survey is especially valuable for river delta areas where it is virtually impossible to get an accurate count of anglers in the myriad tidal creeks and backwaters. Because it is more convenient to the angler in a completed trip survey, the clerk may measure harvested fish and remove an otolith (ear bone) for age determination.

The information is used to estimate a success rate, e.g., anglers caught 0.26 bass per hour. Biologists then combine the data for all anglers fishing for a particular species so that a picture of the average conditions emerges. Generally, 30 to 35 surveys are conducted over three months to ensure that estimates are not colored by a few great days or dry spells.

Creel surveys directly sample how well the fishery provides recreation and pleasure for the anglers. The Game and Fresh Water Fish Commission conducts about 20 such surveys each year on major fishing areas to assess a number of research and management activities.

What Is Good Fishing?

Survey results compare how "good" fishing is in various Florida waters. For example, in an average Florida lake, it takes about four hours to catch a keeping-size largemouth bass (0.25 fish per hour). In a good bass lake, anglers haul in a keeper every three hours (0.33 fish per hour). It may take as many as six hours in some of our sterile, clear-water lakes or in highly polluted situations.

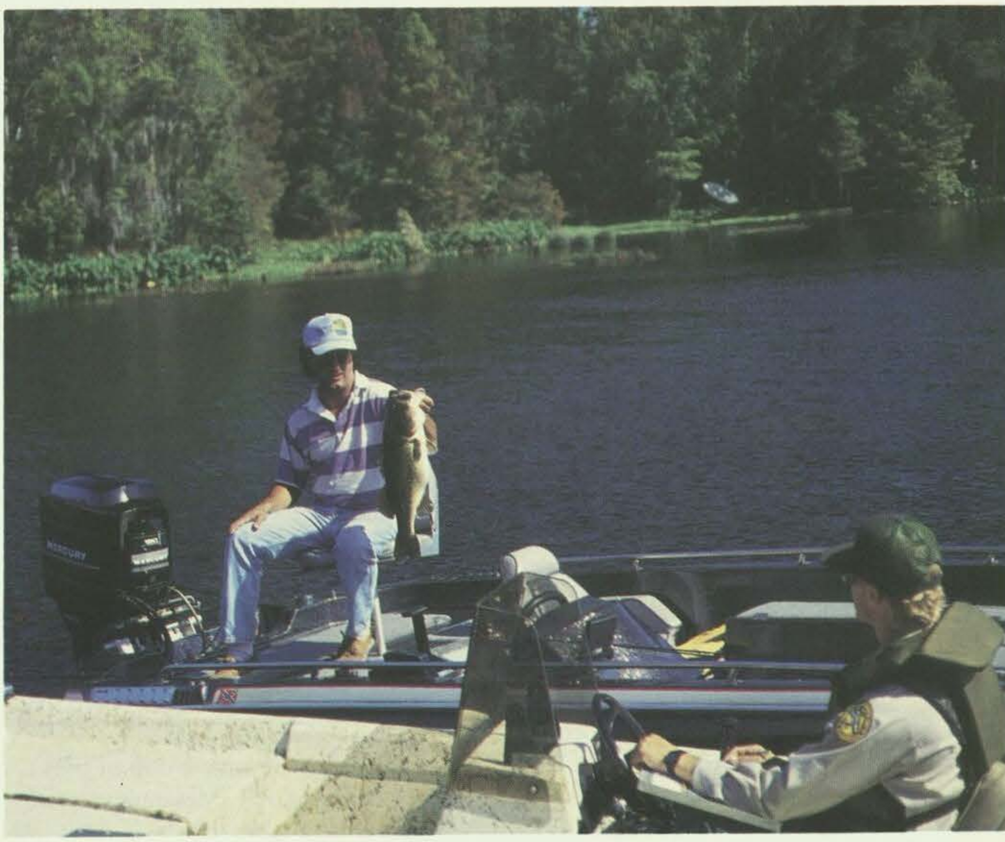
Many Florida lakes sport impressive catch rates: Okeechobee, Kissimmee, Harris and Orange, among others, have produced over 0.33 bass per hour consistently over the past dozen years. In some cases, anglers caught a bass every two hours or less (0.50).

Drawdowns have provided a shot in the arm for many lakes, although increased success rates seldom persist beyond about five years in the face of deteriorating habitat and heavy pressure. Lakes Tohopekaliga, Griffin, and Talquin have all featured good bass fishing after reflooding.

Other fisheries may run hot and cold, depending on environmental conditions. The Apalachicola River tailwater, noted for its striped and sunshine bass fishing, had largemouth bass success rates over 0.50 in the early 1980s. By 1989, the success rate for largemouth bass had dwindled to nil. Apparently, the lack of rainfall pushed very few fish through the Jim Woodruff Dam, much to the disappointment of largemouth bass anglers.

Recent surveys in the Everglades Conservation Areas indicate seasonally good fishing for largemouth bass. When the marsh is inundated, it is easily accessible to sportfish, but not to fishermen. Although anglers frequent the canals, much of the fish productivity occurs in the flooded, marshy areas where forage is abundant. In the winter of 1988-89, Conservation Area 2 had a harvest rate of 0.38 caught and kept per hour for largemouth bass, and a total catch rate of 1.1 fish per hour (see mercury article, page 3).

Two bream per hour is considered good fishing, though ▷



MICHAEL HILL

Left: A wicker fish basket (creel).

Right: A creel clerk conducts a roving patrol.

PEGGY PERKERSON

Anglers show off a stringer of speckled perch from Lake Talquin.

success can exceed three bream in an hour's work in some spots. For example, Lake Okeechobee yielded over three bream per hour on seven occasions since 1977. Except for those times of year when panfishing is light, Lake Kissimmee has averaged 2.3 bream per hour since 1974. Lake Victor, a Commission-managed impoundment, produced an eye-popping 4.41 bream per hour in spring 1989.

Black crappie (speckled perch) fishing is good when anglers can harvest 1.5 to two fish per hour. Lake Okeechobee rightfully claims the "speckled perch capital of the world" title. Over the past 12 years, the success rate for speckled perch was 2.03 fish per hour on the "Big O." As recently as 1988, a success rate of 3.3 specks per hour was documented. This lake failed to produce at least one black crappie per hour only twice, during historically low water levels in 1980 and 1981.

Catch and Release

In recent years, many bass anglers have taken to releasing their catch in a spirit of conservation and in pursuit of larger bass. With so many fishermen recycling fish, the old standard of 0.25 bass per hour may no longer be adequate to gauge the quality of a bass fishery. Creel surveys now account for all bass *caught* rather than focusing on only those fish which are kept.

Catch and release presents new challenges. While it is easy to verify fish in the livewell, the survey clerk must depend on the angler's recollection to get an accurate count of those fish released. If the interview occurs at the end of a long day on the water, the angler may have legitimate difficulty in recalling the number and size of fish he turned back. Certainly, no fishermen I've ever known would stretch the truth in such circumstances.

The St. Johns River has been very productive for catch-and-release fishing. Lake George and Lake Dexter (including the river stretch to Crows Bluff) had success rates for all bass caught ranging from 0.3 to 0.8 through most of the 1980s. Lake Kissimmee produced a bass for each two hours of work during spring, summer and fall of 1988.

Creel Surveys and Fish Management

Biologists conduct creel surveys to evaluate a variety of management and research activities, especially in assessing the effects of experimental regulations. After an 11-14-inch slot limit was imposed on Lake Talquin in 1986, the catch rate for largemouth bass increased steadily for several years. In this case, improvement was due to protection from overharvest of an extraordinarily large group of bass spawned in 1984. Measurements of bass from anglers' creels documented the size of bass taken increased along with the number of fish caught per hour.

Creel surveys are also used to judge the ultimate success of supplemental stocking programs. Sunshine bass have been stocked since 1976 in the Apalachicola River-Lake Seminole system. Surveys taken below the Jim Woodruff Lock and Dam in Chattahoochee for the past 11 years showed that anglers harvested from 1,500 to over 7,000 sunshines each spring. In seven of those years, a harvestable-size sunshine bass was caught for every two hours of fishing — evidence of a successful stocking program.

In the case of Lake Victor, the excellent panfishery confirms the success of an ongoing northwest Florida impoundment management program. This 130-acre lake in Holmes County receives regular fertilization and liming to increase fish productivity. Although the average size of bream caught was not great, the impressive harvest rate is proof of a positive response.

The effectiveness and timing of drawdowns can be measured through creel surveys. After Lake Talquin was dewatered in 1983 (see article, page 20), improved habitat greatly increased fish production. Prior to the drawdown, summertime bream harvest was about 90,000 fish. After the lake refilled, fishermen took from 114,000 to 155,000 bream in spring-summer each year from 1985 to 1989.

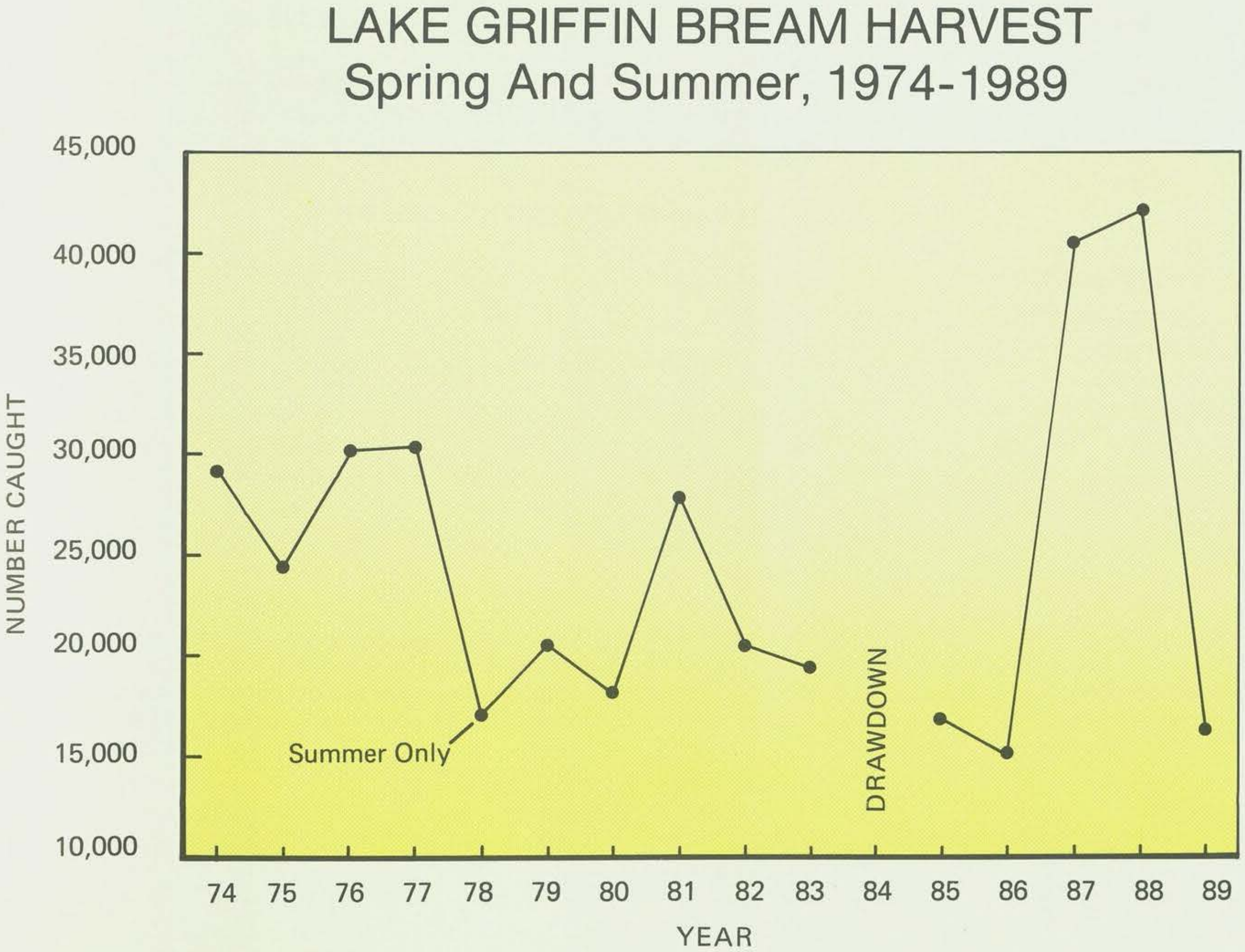
Creel surveys documented the rise and fall of the bream fishery in Lake Griffin in Lake County. This popular lake historically sported extensive growths of water lilies that provided excellent sportfish habitat. The withering effects of urbanization had virtually eliminated the emergent plant community by 1980 and had left the lake with muck deposits over 10 feet deep. Its panfishery suffered in kind, as bream harvest dwindled throughout the 1970s and early 1980s.

Following a 1984 drawdown, aquatic plants once again became established in the northern half of this 9,100-acre lake, and the bream fishery responded dramatically. Unfortunately, because of drainage problems, the drawdown did not sufficiently lower the water level so that the organic ooze could completely dry out. The newly established plant community was chemically treated in 1986. As a result, the benefits of this drawdown have not persisted as long as in other dewaterings, and bream harvest has declined accordingly (see graph below).

1989 Scorecard

How did Florida's lakes stack up for 1989? For largemouth bass fishing, the best success could be had on the St. Johns River in Lake Dexter and upriver to Crows Bluff (0.64 per hour, kept or released). Okeechobee gets the nod for black crappie. Its success rate of 2.24 fish per hour was not as great as that for Lake George (3.19), but its staggering harvest of nearly 280,000 specks dwarfed the 2,000 crappie taken from George. Little Lake Victor had a tremendous success rate of 4.41 panfish per hour of fishing (see table, page 40).

So, if you happen to be accosted by one of the Commission's roving survey clerks during a fishing trip, you will know what he is up to. Take a few minutes and answer his questions, chat a while, spin a fishing yarn or two, but by all means, don't ask him where they're biting. ▷



Florida's Best Fishing Waters 1989

BREAM

Lake	Season	Number Caught	Hours Fished	Success (No./Hour)
Victor	Spring	31,247	7,118	4.41
Lake Dexter/Crows Bluff	Summer	36,354	11,791	3.60
Okeechobee	Spring	107,279	41,574	2.71
Kissimmee	Fall	27,781	10,526	2.61
Lake Washington/Hellen Blazes	Winter/Spring	1,581	1,486	2.53
Tohopekaliga	Fall	18,394	7,787	2.46
Kissimmee	Summer	70,496	35,374	2.23
Griffin	Summer	3,948	2,223	2.16

BLACK CRAPPIE

South Lake George	Spring	1,950	1,183	3.19
Okeechobee	Spring	279,098	120,382	2.24
Griffin	Summer	7,000	3,206	1.99
Kissimmee	Summer	11,289	7,544	1.40
Harris	Spring	2,073	1,021	1.39
Griffin	Winter	171,452	132,603	1.23

LARGEMOUTH BASS (KEPT AND RELEASED)

Lake Dexter/Crows Bluff	Summer	6,304	8,657	0.64
South Lake George	Summer	2,861	4,616	0.59
Tohopekaliga	Fall	20,353	40,162	0.51
Okeechobee	Spring	46,559	103,512	0.46
Lake Dexter/Crows Bluff	Spring	3,680	8,164	0.46
Victor	Spring	492	1,071	0.46
Kissimmee	Summer	30,926	72,166	0.43
South Lake George	Spring	2,458	6,562	0.40
Talquin	Winter/Spring	16,360	38,462	0.39

Some of Florida's better fishing lakes during 1989, based on success rate (fish per hour). However, success alone is not the only determinant of a good lake. South Lake George produced black crappie at an excellent rate, but relatively few fish were caught. Success calculations are made for several discrete time periods and averaged over the survey, rather than simple division of the number of fish caught by number of hours fished.

Scott Hardin is a data analyst for the Division of Fisheries. He served as editorial assistant for this special fishing issue.

Ask Your Biologist

Dear Fisheries Biologist,

I recently moved to Florida from a northern state, and I'm surprised to find your agency doesn't have a statewide minimum size limit for largemouth bass. Wouldn't a 12-inch minimum size limit improve fishing here?

A New Florida Resident,
Lake Placid

Dear New Resident,

The idea that a 12-inch minimum size limit on largemouth bass would improve fishing is one of the most common misconceptions among Florida anglers. Although this type of regulation is a fairly standard management practice in other states, particularly in the northern part of the country, there is relatively little biologically sound application for it here.

Many local fishermen seem to think that by protecting smaller bass with a minimum size limit, more young fish will survive, eventually resulting in a "bigger and better" bass population. Florida fisheries biologists are especially concerned with protection of larger bass. Even though the 12-inch minimum size limit may be necessary in other states, environmental conditions and biological considerations of bass populations in Florida are extremely different.

The use of minimum size limits is generally a viable bass management technique where growth rates are slow and production, or recruitment rates, are low. These two conditions are not typical of Florida waters, however. Because of Florida's sub-tropical climate, fish continue to grow throughout most of the year, and due to usually good spawning success, productivity is very high. Compared to northern conditions, bass in Florida grow much faster and typically reach a length of 12 inches in about two years. Therefore, when these smaller bass are removed by anglers, they are replaced fairly quickly. Most of Florida's size restrictions on bass favor the protection of larger and older fish which obviously take much longer to replace once harvested.

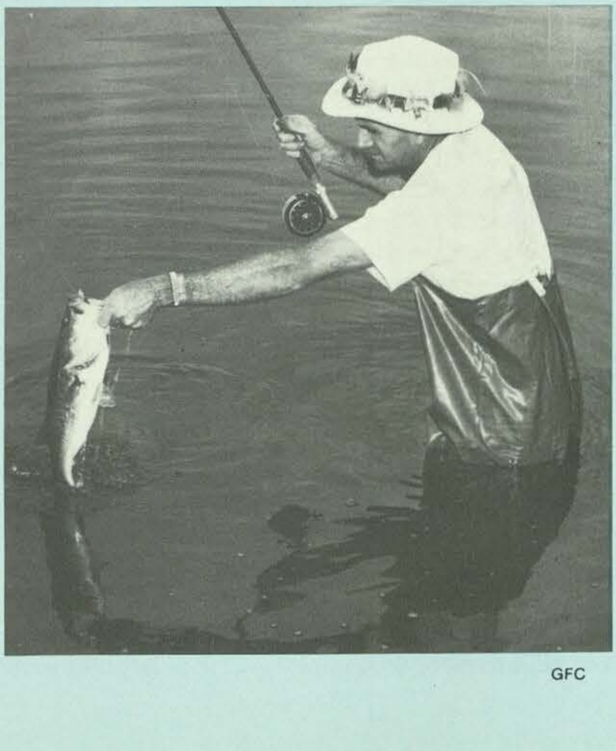
In effect, a voluntary or self-imposed minimum size limit is now being practiced by fishermen on many Florida waters. Creel surveys on these areas have documented that anglers may commonly release 80 to 90 percent of bass smaller than 12 inches, even in the absence of a legal requirement.

Some concern even exists among Florida biologists that protection of smaller bass may have negative effects on the overall bass fishery. By unnecessarily restricting harvest of small bass, their numbers may increase to undesirable levels, causing excessive competition for available food. When this occurs, growth rates are slowed and the size structure of the population may become dominated by small bass. Low-quality fishing and decreased angler satisfaction are the eventual results.

Fishermen should realize that an exceptionally wide range of biological conditions exists in Florida. Population dynamics of bass fisheries can vary greatly between water bodies that may be only short distances apart. Therefore, a single statewide size regulation could not be justified biologically or expected to produce consistent results. In the future, as additional size restrictions are carefully implemented, they must be designed to meet the specific needs of individual water bodies in order to provide the best chances for success. Although a 12-inch minimum size limit may have some specific use on a very limited number of Florida waters, it is likely that this particular restriction will be a poor management choice for the vast majority of bass populations in our state.

Phil Chapman
Fisheries Biologist
South Region, Lakeland

Phil Chapman is the research project leader for the Commission's Sportfish Enhancement Project.



GFC

Florida Regional Fishing Guide

BURTON McNEELY

REGIONAL FISHING HIGHLIGHTS

Every fisherman, at one time or another, relishes the thought of fishing a new lake, river or reservoir where the water is swarming with fish that have never seen a lure. While such water bodies in Florida are scarce, there are many excellent fishing waters that don't receive the attention they deserve.

In many instances, anglers have to do a bit of research to zero in on the best fishing opportunities an area offers. Some waters are ignored. Others are fished because of their reputation. Still other waters will be tapped because they are on the rebound, thanks to modern fisheries management.

With more than three million acres of lakes and 12,000 miles of streams and rivers, Florida provides some of the finest freshwater fishing in the United States. The state's waters are prolific with game fish such as largemouth bass, bluegill, redear sunfish, crappie, redbreast sunfish, warmouth, sunshine and striped bass. Here's a regional look at some selected waters in the state. For additional information, contact your closest Commission office, listed on page 48 of this magazine.

— Mark Trainor

NORTHWEST REGION

The 13 counties in the Commission's Northwest Region are geographically quite different from peninsular Florida. Well-drained by several rivers, the region is dotted with sandhill ponds. As you travel west past the Apalachicola River, the rolling hills become sandier. Although some lakes and rivers hold tannin-stained water from cypress swamps, many ponds are crystal-clear. The aesthetic appeal of observing a white-sand bottom in 10 feet of water notwithstanding, these ponds typically do not sustain sizable fish populations.

The potential of a pond or lake to produce fish depends on the fertility of its bottom soil and watershed. The attractive white sand in west Florida has few nutrients to spur fish growth. Therefore, the Commission has been adding lime and fertilizer to six man-made impoundments in the Panhandle to improve fishing.

Every few years, two tons of lime per acre are spread over these lakes to increase water hardness. Liquid fertilizer is added every three weeks or so. The resulting increase in zooplankton helps feed bluegill, shad and other forage fish which, in turn, produces more bass.

A new management twist was added to three lakes in 1988 when lakes Victor, Karick and Hurricane received over 1,000 tons of oyster shells. This newly created habitat was intended to congregate panfish and provide better opportunities for anglers.

Initial results from electrofishing that June indicated nine times as many harvestable-sized sport fish on the oyster shell sites compared to "naked" sites in the pond. In spring 1988, 11 percent of fishing effort and 12 percent of the harvest occurred at oyster shell sites, even though these areas comprised only 1 percent of the ponds. Follow-up surveys confirmed anglers' preference for this new habitat and greater abundance of sportfish at these sites. As an added benefit, the oyster shells have helped to increase hardness in these soft waters.

Oyster shell sites at these three lakes are marked on each corner and feature a floating orange and black buoy in the center of the area. They have been positioned just offshore from earthen fishing fingers extending into the lake for bank fishermen. Anglers may use boats, but outboard motors may not be used. Shellcracker should begin to use the oyster shell bottom as a spawning site in March. By May, bluegill will begin their extended summer-long spawning season.

— Scott Hardin

Commission Managed Impoundments

Lakes	Acres	County
Bear	107	Santa Rosa
Hurricane	318	Okaloosa
Karick	58	Okaloosa
Juniper	670	Walton
Stone	130	Escambia
Victor	130	Holmes

Other notable waters: If you're looking to catch some huge shellcracker, Merritt's Mill Pond near Marianna is where to find them. Seven state record and two world record shellcrackers have been caught in this small, clear, spring-fed lake. The lake is 7 miles long and ¼ to ½ mile wide. The pond provides good small bass and panfish fishing. The secret for catching shellcrackers is using light line and red wiggler worms for bait.

However, the pond will be closed to fishing from April 1, 1990 until after a restoration drawdown is completed in the summer. This drawdown is necessary to revitalize the aquatic plant community and maintain this quality fishery.

Some nice striped and largemouth bass fishing can be found at Lake Talquin near Tallahassee. Talquin is a 10,200-acre impoundment on the Ochlockonee River that has many drop-off and holes (average depths of 15 feet and maximum depth is 50 feet). Anglers should use caution when boating because of submerged stumps and standing timber. Talquin also offers good strings of speckled perch, bream and catfish. All largemouth bass less than 14 inches in length are illegal to possess.

NORTHEAST REGION

Suwannee River Stumpknockers

One scientist described the stumpknocker (spotted sunfish) as a pugnacious nest-guarder. Actually, the fish is just plain pugnacious, particularly in regards to biting a hook, which is one reason it's worthy of special respect from fishermen in all Florida rivers.

Catching fish depends on their biting what's on the hook, so all fishermen are interested in which bait is best. Abundance of the right-sized food organisms is the key to rapid growth for all fish, and the Suwannee River and its stumpknockers are no exception.

The Suwannee River grows lots of forage. One reason, on which good fishermen capitalize, is the expected seasonal flooding of the wooded bottomlands of the lower river, allowing all fish a chance to forage aggressively on terrestrial insects and invertebrates. Generally, healthy rivers grow more fish in downstream reaches because they are more productive. More water plus more nutrients plus more vegetation add up to more available fish food.

Biologists and Suwannee River fishermen find stumpknockers in a variety of habitats, from the upper river swamp-like areas below the Okefenokee to tidal sawgrass creeks in the Gulf of Mexico. Even though the world record stumpknocker (12¾ ounces, 8½ inches long) came from the upper river, more and bigger fish usually come from the fertile lower river.

The Suwannee River is known for its good days of catching pound-size redbellies on the bed in the spring, but the consistent scrappiness of the stumpknocker makes it an outstanding, sought-after fish. And its pretty color, chunky physique, and flavorful, sweet-tasting meat don't hurt its reputation any, either. They supposedly prefer more quiet water than the redbelly, but you find them both in the same stretches of river. They may be in swift, rocky areas, in eddies, or on straight, steep banks hiding behind cypress stumps. From these spots they attack crayfish or anything else they feel like eating. Meal worms or crickets below a float or sunk to the bottom are typically destroyed by stumpknockers. Many fishermen ▷

have found that flyrod popping bugs cannot be ignored by these fish, which have a look-see-attack cycle built into their instincts. A sure bet is to place a bug or bait in those places where it can be still for a few seconds before the current moves it away.

The stumpknocker grows biggest and acts meanest where it does battle with fiddler crabs in lower river tidal creeks. The fish hang out in small tributaries and sit in deep holes beneath undercut banks while waiting to attack small crabs, shrimp, beetle spins, jigs, Rapalas and other bait or lures.

So from one end of the Suwannee, from the swamp to the sea, the just-plain-pugnacious stumpknocker is a worthy opponent and a fine fish.

— Jerry Krummrich

Other notable waters: The largest lake in this region is Orange Lake, located southeast of Gainesville. The 12,700-acre lake is well-known for its lunker bass. It also produces large numbers of small bass, bluegill, shellcracker, crappie and warmouth.

Lochloosa Lake (8,000 acres) is connected to Orange Lake by Cross Creek, a natural, 1¼ mile-long channel. It is better known for its large bass and large crappie and bluegills. Both lakes are shallow (8 to 10 feet deep) and have lots of grass beds and lily pads.

CENTRAL REGION

Lake Panasoffkee

Lake Panasoffkee is a 4,460-acre, spring-fed, clear lake lying in Sumter County, just west of I-75 and north of C.R. 470. The lake is shallow, clean, soft-bottomed and heavily vegetated with vast areas of eelgrass. Lake Panasoffkee drains into the Withlacoochee River through a channel known as the outlet river.

Bass and speckled perch fishing are good, but the lake primarily attracts bream fishermen — especially folks seeking shellcrackers. Bream (bluegill, shellcracker, stumpknocker and redbreast) usually spawn in the spring and congregate in the scattered open areas that occur throughout the dense carpets of vegetation. Shell Point and Grassy Point are excellent areas to search for spawning fish.

There are several full-service fish camps located around the lake, and a Commission-constructed public boat ramp is located in a county-maintained park on the outlet river. Water sports activities such as skiing and pleasure boating are uncommon, and commercial fishing pressure is low.

Rainbow River

The Rainbow River is a 5.7-mile-long spring-fed stream that empties into the Withlacoochee River near Dunnellon in western Marion County. The first mile of the river is closed to fishing and includes a first-magnitude spring that discharges an average of 493 million gallons of water a day.

Largemouth bass, bluegill, shellcracker, stumpknocker and redbreast sunfish are abundant. January, February and March are the best months to fish because during warmer months there are numerous snorkelers, swimmers, SCUBA divers, tubers and pleasure boaters.

All food and beverages must be in non-disposable containers and alcoholic beverages are not permitted. Boats are also limited to idle speed.

There are several full-service fish camps located along the Withlacoochee River in the vicinity of Dunnellon. A Commission-constructed public boat ramp is located in a city-maintained park next to the U.S. 41 bridge in Dunnellon.

— Vinard Hitt

Other notable waters: One of the best bass lakes in the state is Lake Tohopekaliga (also called "Toho"), near Kissimmee. It is about 14 miles long (22,700 acres). Lake Toho offers good numbers of 7- to 10-pound bass in the late winter and early spring.

On the northern fringe of the Ocala National Forest lies Rodman Reservoir, a man-made impoundment of the Oklawaha River, that became very productive and nationally known for huge largemouth bass in the late 1960s. This remote and wild area has few public landings as access points. The original forest stands dormant in the water with the treetops cut off at the water line.

EVERGLADES REGION

Lake Blue Cypress

Lake Blue Cypress is one of Florida's most beautiful lakes. The lake is approximately 4½ miles wide by 7 miles long, encompassing 6,555 acres.

The natural beauty of Blue Cypress radiates from its underdeveloped shoreline consisting of cypress swamp, marshland and creeks. The shoreline zone is abundant year round with wildlife, including alligators, herons, egrets, eagles and ospreys. The lake's beauty is enhanced by its solitude, as it is one of Florida's least crowded major water bodies. The lake's location is distant from large urban population areas and therefore attracts only the serious fishermen.

Largemouth bass, bluegill, redear sunfish, black crappie and sunshine bass are the lake's most sought-after inhabitants. South Florida's warm climate provides for year-round opportunity to pursue these fish while enjoying the lake's picturesque setting. While each of these species can be caught year round, there are certain times when harvest rates increase.

January, February and March are the best black crappie producing months. Crappie are found in spawning schools during the winter. Crappie jigs fished during the early morning and evening hours work well on Blue Cypress. Other productive methods include trolling with beetle spins or drifting with minnows at various depths to locate wandering schools.

Cooler water temperatures and crappie fishing methods coincide with best sunshine bass harvest techniques. Most sunshine bass are caught by crappie fishermen, providing the angler with a double treat. Fishermen who specifically target sunshine bass will use live shad or minnows fished near areas of water flow, such as mouths of creeks or canals. Sunshine bass populations are maintained by the Commission's stocking program.

Plastic worms or live shiners are the best bets for largemouth bass. These baits are fished in Blue Cypress by casting against and around the hundreds of cypress trees. Cavities in the trees as well as unseen sunken logs provide havens occupied by Florida's favorite predatory fish. These and other baits are also productively fished in and around the many varieties of aquatic vegetation including spatterdock, bulrush and maidencane.

Those same types of structure provide excellent bream fishing. During the summer months, bluegill are susceptible to flyrod fishing with a dry fly during early morning and evening hours. During midday, live baits such as worms or crickets fished deeper are a better choice. In cooler months the flyrod will be more productive changing to a wet fly. Trolling with a beetle spin in open water parallel to the shore approximately 100 yards out is a popular method for bluegill during cooler months.

April is the beginning of the peak redear sunfish fishing. With the onset of spawning, they congregate in areas called "beds." A shellcracker bed may be small, holding only a few fish, or it may be large with several hundred frying-size individuals. Spawning activity and fishing appear to be enhanced by the full moon. Beds can sometimes be located by witnessing moving vegetation caused by feeding disturbances, or beds can be located by trial-and-error fishing. Once the bed is located, live worms should produce multiple catches.

At Blue Cypress, one can get away from it all and enjoy the primitive scenery, wildlife and excellent fishing. Located in western Indian River County, Blue Cypress road is approximately 26 miles west of Vero Beach and six miles east of Yeehaw Junction off S.R. 60. You can reach S.R. 60 by either I-95 or the Florida Turnpike. Take unpaved Blue Cypress Road five miles to Joe Middleton's Fish Camp (407) 562-9971, where boats, motors, tackle, ice, bait, overnight accommodations and guide service are available. A public boat ramp constructed and maintained by the Commission provides access to the lake.

The Everglades

To visualize the Everglades, one must try to comprehend its vastness. It is the largest freshwater system in south Florida, extending south from Lake Okeechobee 100 miles to Florida Bay. A large part of the southernmost portion lies within the Everglades National Park, which encompasses 2,200 square miles of mixed salt, brackish and freshwater habitats. Freshwater communities include sloughs, ponds and creeks, wet prairies, sawgrass marshes, cypress forests, willow heads and bayheads interspersed with upland communities of tropical hardwood hammocks and rockland pine forests. The park provides excellent fishing for both fresh- and saltwater varieties.

To the northwest of the park lies a 2,400-square-mile area known as Big Cypress Swamp (Big Cypress National Preserve). The dominant plant communities are Everglades marl prairies and cypress forests.

To the north of the park are the Everglades Water Conservation Areas (WCAs). Conservation Areas 1, 2 and 3 are located in the western portions of Dade, Broward and Palm Beach counties. These areas, covering 1,345 square miles, are easily accessible to east coast anglers and receive the majority of the freshwater fishing activity.

Largemouth bass, bream and black crappie are the most sought-after species. Catches of Oscars, an exotic fish, are quite common, while occasional catches of saltwater varieties, such as snook or tarpon, are reported.

While largemouth bass fishing in the Everglades is a year-round activity, at times it can produce "feast or famine" results, depending upon water levels. Water levels vary depending upon rainfall and water regulation schedules maintained by the South Florida Water Manage- ▷

ment District through a 1,400-mile-long system of canals, dikes, water control structures and pumps.

Largemouth bass in the Everglades grow faster and attain a larger size when high water is retained throughout the interior marsh area. During this time the bass have more habitat and available forage with less competition for food. Since the majority of the fishing takes place in the perimeter canals, the "famine" is experienced when many of the bass become widely dispersed into the interior marsh. The "feast" fishing in the Everglades occurs during periods of low water, when fish are forced out of the expansive marsh and concentrated in the surrounding canals.

Results from a six-month fishermen survey conducted in 25 miles of canals in Conservation Area 2 (Dec. '88 - May '89) showed bass anglers fished for 56,000 man-hours and caught 60,000 bass, of which 65 percent were voluntarily released. That represents an impressive catch rate of over one fish per hour.

The bream category is composed of bluegill, redear sunfish, warmouth and spotted sunfish. Bream fishermen spent 9,000 hours fishing and harvested 20,000 fish for a success rate of 2.25 fish per hour.

Conservation Area 1

WCA 1 is managed by the U.S. Fish and Wildlife Service as Arthur R. Marshall-Loxahatchee National Wildlife Refuge. The 220-square mile area provides recreational fishing, wildlife observation and waterfowl hunting. Fishing is generally limited to the canal system, but is excellent for bass, bluegill, redear sunfish, warmouth, spotted sunfish and catfish. Access is provided at the Refuge Headquarters off U.S. 441 (407-732-3684); and Loxahatchee Recreation Area (305-426-2474) S.R. 827 at U.S. 441 near the Palm Beach/Broward County line.

Conservation Area 2

WCA 2 consists of 210 square miles of Everglades marsh connected with perimeter canals. Largemouth bass, bluegill, redear sunfish, and warmouth are in abundance with occasional occurrences of snook and tarpon. Main points of entry are the Loxahatchee Recreational Area (305-426-2474) on S.R. 827 off U.S. 441 at the Palm Beach/Broward County line; and the Sawgrass Recreation Area (305-389-0202) on U.S. 27, two miles north of Alligator Alley (S.R. 84).

Conservation Area 3

WCA 3 covers 730 square miles of Everglades wetlands bordered by a canal system. The most sought-after sportfish are bass, bluegill, redear sunfish, and warmouth. Main access points are Everglades Holiday Park (305-434-8111) on U.S. 27, six miles south of S.R. 84; and Mack's Fish Camp (305-822-5033) on Danell Lane off Krome Avenue, one-half mile south of U.S. 27.

[NOTE: Please refer to the mercury article beginning on page 3. Several species of fish in some of these areas are contaminated by mercury, and the Department of Health and Rehabilitative Services has issued health advisories. Nevertheless, the fishing is still good, and voluntary catch and release is a sporting approach.]

— Frank Morello

Other notable waters: The largest lake in the state is Lake Okeechobee (also known as the Big "O"). It is the largest natural, freshwater lake in the United States entirely within one state (not counting Alaska). The 750-square-mile lake is world renown for its year-round lunker largemouth bass fishing. It also has an excellent reputation for its crappie and bream fishing. The Big "O" is a shallow lake (6 to 10 feet deep, deepest at 13 feet) with lots of submerged and surface vegetation.

Another big bass lake is Lake Trafford near Immokalee. The 1,500-acre lake has an excellent sport fishery consisting of shellcracker, crappie and catfish. Trafford is a shallow lake (9 feet) with lot of hydrilla patches that make for good bass fishing.

SOUTH REGION

Lake Tarpon

Lake Tarpon provides a variety of recreational opportunities for many residents and visitors to Florida's Suncoast. This 2,534-acre lake is 5 miles long and up to 1 mile wide and is located within the Tampa Bay metropolitan area. While conveniently situated within one mile of Pinellas County's famous beaches on the Gulf of Mexico, Lake Tarpon provides excellent freshwater fishing for largemouth bass, bluegill, redear sunfish and black crappie.

Although urban development will ultimately lead to serious water quality problems, the increased fertility has initially resulted in an expansion of Lake Tarpon's sportfish population. Unabated, this change in water quality could lead to serious problems in the future. To prevent degradation of the lake, a committee of agencies responsible for environmental management and concerned citizens was formed, and in 1987 a comprehensive lake management program was initiated.

Lake Tarpon's new-found reputation as a top fishing lake has caught on quickly with fishermen throughout central Florida and draws anglers from all over the United States. Lake Tarpon is famous for a 19-pound largemouth bass caught in 1961 that held the Florida record until just recently. Bass action is best during late spring and early summer. Fall and winter offer good catches of black crappie, while bluegill and redear sunfish are taken throughout the year. Four brush-and-log fish attractors have been constructed to enhance fishing success. Marked fish attractors are good starting points for anglers not familiar with the lake. Excellent facilities and boat ramps are available at two Pinellas County parks: Anderson Park off U.S. 19 and Chestnut Park off East Lake Road. No boat rentals are available, however. For further information please contact the Florida Game and Fresh Water Fish Commission office in Lakeland (813) 644-9577 or the Tarpon Springs Chamber of Commerce (813) 937-6109.

Phosphate Pits

Strip-mining operations to remove phosphate ore from vast areas in Hillsborough, Polk and Hardee counties have created some of the best bass fishing in North America. Phosphate mining leaves hundreds of deep, fertile lakes referred to as "pits."

Limited fishing pressure and other factors are responsible for terrific fishing for black crappie, bluegill and redear sunfish in phosphate pits. Soils and subsurface geology contribute nutrients to the water, resulting in high fish production. Fertile pits are able to produce extremely strong populations of forage fish, panfish and largemouth bass. The mining cuts create irregular shorelines with steep slopes and numerous points, sandbars and underwater structures, providing many diverse habitats for bass and panfish. These factors distinguish pits from natural Florida lakes.

While most pits are closed to the public, some areas have been acquired for public fishing and are managed by the Commission. One such area is Tenoroc State Reserve, a 6,800-acre fish management area near Lakeland. Special regulations are designed to "recycle" anglers' catches by promoting "fishing for fun." Reduced harvest and controlled fishing pressure effectively maintain excellent fishing success rates. Saddle Creek Park near Lakeland and Edward Medard Park west of Plant City in Hillsborough County are large recreational areas with hundreds of acres of bass-filled waters. For further information, please call the Commission in Lakeland at (813) 644-9577 or the Florida Phosphate Council at (813) 646-8583.

Lake Istokpoga

Lake Istokpoga, (27,692 acres) Florida's fifth-largest lake, is located 25 miles northwest of Lake Okeechobee in a remote portion of Highlands County. Okeechobee's world-class reputation overshadows Istokpoga, one of the best-kept secrets in Florida. During the spring, nests of spawning sportfishes are plainly visible in over 6 feet of water.

There is quite a contrast between the northern and southern shorelines of Lake Istokpoga. Large fields of lily pads bordered by aquatic grasses and cypress trees line the southern end of the lake, while the northern shoreline is characterized by vast expanses of bulrush and cattail. Eelgrass and hydrilla beds can be found throughout the lake and are very productive. Anglers should be aware of the fact that, despite intensive management efforts, hydrilla is very prolific on Lake Istokpoga and at times navigation can be difficult.

Sporting a healthy 180 pounds of sportfish per acre, Istokpoga offers outstanding fishing opportunities. Anglers usually target largemouth bass, bluegill and shellcracker. Clear water permits bass to see great distances, translating into exceptional conditions for topwater and fly fishing. Popular fishing areas include the mouths of Josephine and Arbuckle creeks, which are located at the northern end of the lake. Vegetation around the islands and the fringes of hydrilla beds are also known fish producers.

In addition to three public boat ramps, Lake Istokpoga supports five fish camps offering full accommodations. The reason Istokpoga is relatively unknown is that it is overshadowed by some of the most famous lakes in the nation, including Lake Okeechobee and the Kissimmee Chain. Lake Istokpoga does not receive the exposure and promotion that these other outstanding lakes do, but it is well worth a visit. For more information call the Commission at (813) 644-9577 or the Chamber of Commerce at (813) 465-4331 in Lake Placid.

— Tom Champeau

The staff thanks those Commission public information specialists and fisheries biologists who contributed materials to this first special fishing issue.

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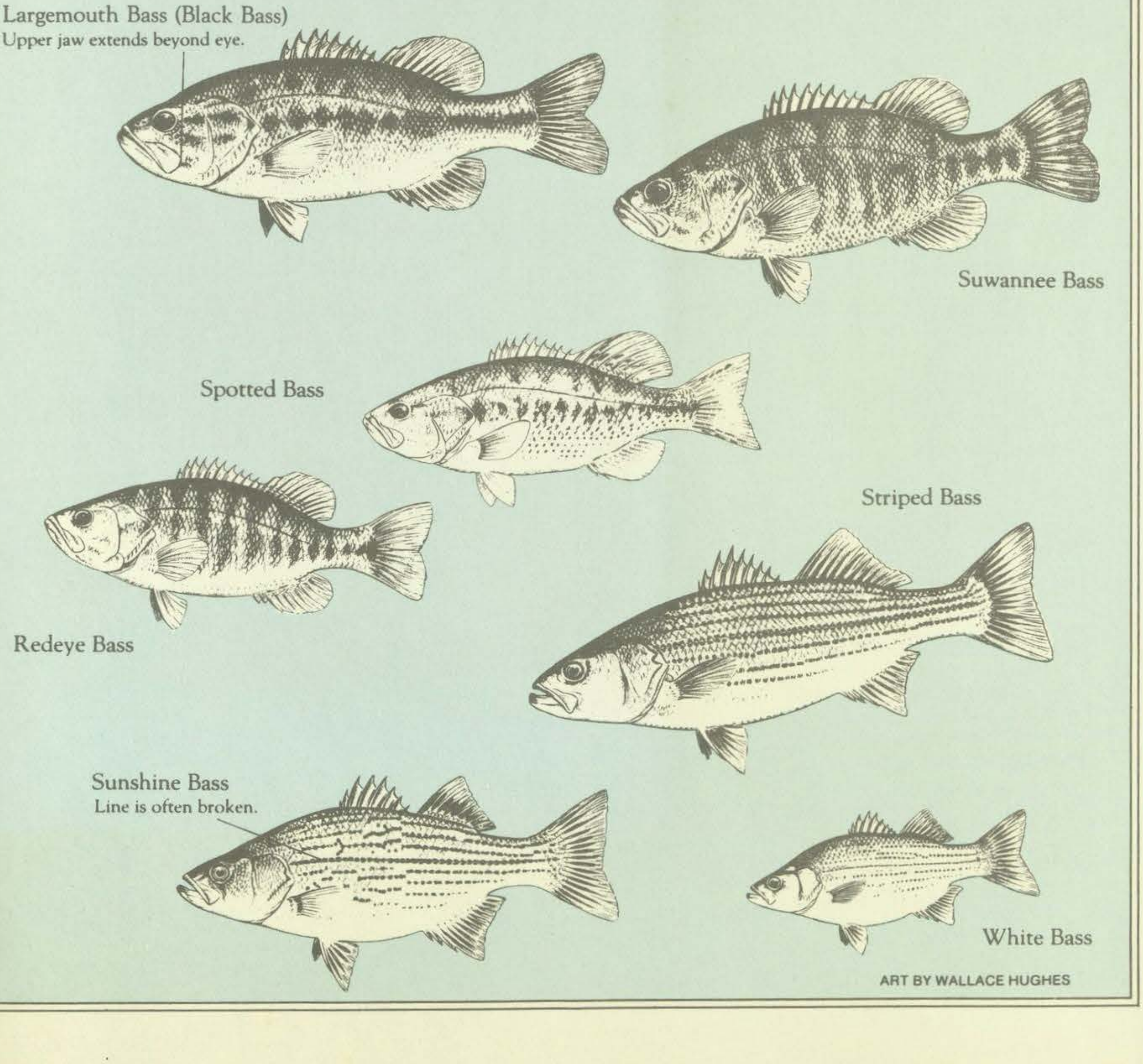
Floridana

Look at the seven bass illustrated below. Would you be able to name each one if we hadn't already done it for you? While it may be easy to tell a spotted bass from a striped one, the differences between others, say a Suwannee and a largemouth or a sunshine and a striper, are more subtle.

The largemouth, Suwannee, spotted and redeye bass are members of the sunfish family and not "true" bass. They all have the same basic shape and similar coloration. The largemouth grows to a larger size of course, but if you caught a 2-pounder, how would you know it wasn't a Suwannee? Look for a separation between the spiny- and soft-rayed dorsal (back) fins on the largemouth as well as a jaw that extends beyond the eye. The smaller redeye bass is aptly named because the iris of its eye is red. The spotted bass has a broken row of lateral blotches on its side, and its belly is somewhat mottled.

The striped bass and white bass comprise the so-called "temperate bass" family. The striper, which grows much larger than the white bass, has distinct unbroken lines along its side. The white bass is arched and its body, deep. The sunshine bass is a hatchery-produced cross between the two. It is not as streamlined as a striped bass and has broken lines along its side.

— Scott Ball



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